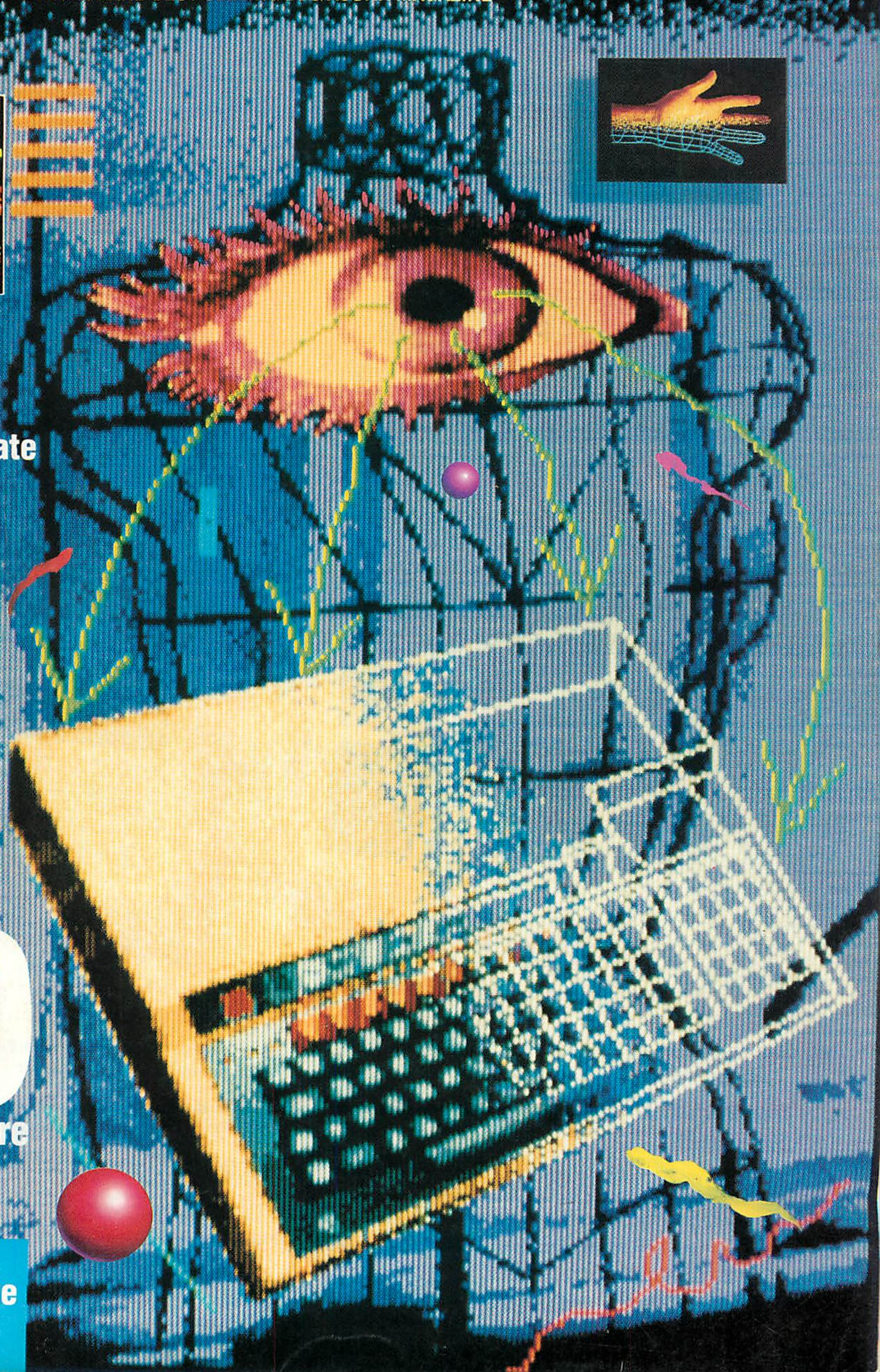
BBC·MASTER·ELECTRON·ARCHIMEDES

£1·30

# ACORN USER

NOVEMBER 1988

BIGGEST AND BEST-SELLING BBC/ACORN MAGAZINE



**EXCLUSIVE:**



First review of Superior's Exile

**CROSS WORDS:**
Program to automate these (8 letters)

**THAT'S LIFE:**
Living in a one dimensional world

**FILE TRANSFER:**
View to First Word to Pipedream

# CAD
Designer software

**COMPETITION:**
Three wide carriage printers to be won

# The Account Book

If you have been thinking of computerising your business or have been disillusioned by the complex manuals and screens of codes most accounting programs offer then you are in for a pleasant surprise. You do not need to know anything about accounting to use **The Account Book**, and no matter how small your business, you will be amazed at how easy your book-keeping will become. There are no strange monthly 'rituals' or data sorting (which is completely automatic), but more importantly, there is no limit to the number of entries you can make. You can see your bank and cash balances, immediately, at any time together with a break-down of all your entries including profit/loss figures and any discrepancies between your receipts and payments which allows you to balance your books with your bank statements with the minimum of fuss. Your entries can be analysed for reports in over 50 different ways. One example of this is listing unpaid invoices from a particular customer, for an individual month, from a certain month to date or for all months. Another is to find out not only how much your motor expenses were, but also how much of it was for, say, petrol. If you are VAT registered, the **Account Book** will produce your VAT lists and returns for any period, automatically.

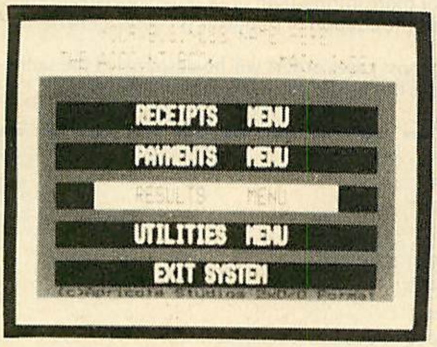
The number of key presses has been optimised for rapid entry of data and by using the labeling facility a single key press will enter all the details of a standing order etc. Help messages are always displayed on screen, but the system is so easy to use, you probably won't need them.

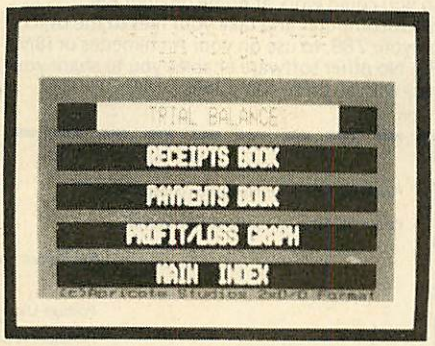
To get you going, a comprehensive and easy to read manual is supplied with the system, and a free telephone help-line service for any technical queries or advice is also provided. **The Account Book** was launched twelve months ago, and our customers range from self-employed people to retail shops and limited companies. The following are two quotes from the many letters of praise we have received:

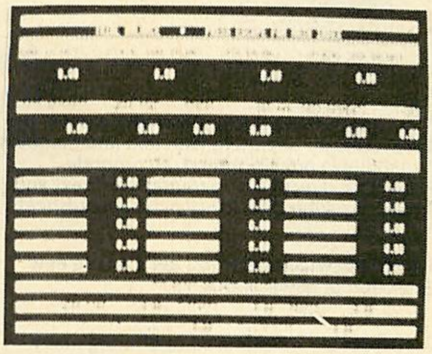
> ***"I have brought my accounts up to date from the beginning of my year, which starts 1st May, without any trouble at all. All nine months are printed out in the neatest possible way.***
>
> ***I have to congratulate you on a very good piece of work. Far, far better than anything I have previously tried for the BBC Master and at a very much lower cost. In fact I have abandoned two rather expensive programs because they are too complicated for the needs of a small business, difficult if not impossible to use, and do not produce print-outs which are helpful. How right you were to design your layout on a normal ledger. It was just what I was looking for. I only wish I had the time and knowledge to write a review of it for the BBC magazines. Someone should."***

> ***"Thank you for the Accounts program which is working well and is, without doubt, the solution to my book keeping problems. . . . . it is incredible value for money and its operation is simplicity itself."***

**Many thanks to Mr Ronald Whitehouse of Maldon, Essex and Mr Geoffrey Allcock of Southampton for allowing us to quote from their letters.**



**The Account Book runs on all models of BBC computer from the BBC B to the Master and requires a minimum of 1 double sided 80 track drive, dot matrix printer and mono or colour monitor. We are at present working on a second module to complement The Account Book which will include invoicing, statements and stock control. There is only one thing left to mention. . . . the price: Just £27.95 inclusive.**

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# PIPEDREAM

## POWER AT YOUR FINGERTIPS

**With Archimedes, you have a breakthrough in personal computing power. Enough power for the next breakthrough in integrated software – PipeDream.**

With existing integrated packages, you have to divide your work into artificial sections, such as text, numbers and calculation, and database.



With PipeDream, you compose your work in the order you want to print it, with text and numbers all together in one document. Incorporate calculations directly into paragraphs of text and formatted paragraphs directly into spreadsheets.

**With this new approach you get a whole new dimension of power . . .**

PipeDream is a word processor offering many columns of formatted text. That film script you were going to write next holiday? Ideal.

PipeDream is a spreadsheet program with a work area of 500,000,000 columns by over 500,000,000 rows, so you'll grow out of your computer before you grow out of PipeDream.

And being able to mix numbers and text together means you can calculate invoices and mail-shot them without resorting to expensive accounting software.

**In fact, PipeDream's unique integration means that mail-shots couldn't be easier.**

Simply type in your letter or invoice, leaving gaps for names, addresses and payment dates. Then PipeDream will print the letter to each addressee, automatically inserting all the details, and keeping the text neatly formatted and aligned.

**And database and spreadsheet functions can work together.**

You can use PipeDream as a database program to maintain your address book or sales ledger. Perform selections and sorts to invoice all of those customers living in London who have bought more than 100 products from you since February but haven't paid within 30 days.

**The price of all this power? Just £99+VAT.**

But don't just take our word for it. This is what Michael Bywater of *Punch* had to say:

*"PipeDream itself is a remarkable achievement. It offers a spreadsheet, a word processor and a database, and if you think I am talking about a conventional integrated program, you are wrong. PipeDream does all those things within one program. No switching between modules or cutting and pasting; PipeDream simply offers you a matrix of 'slots' into which you can either type continuous text or figures or formulae or database 'fields'."*

That was PipeDream on the Z88.

Now we've completely rewritten it for Archimedes. The result is even friendlier, faster and more powerful. There are full menus and dialogue boxes, making the most complex operations easy to carry out. You'll probably never even need to look at the comprehensive PipeDream tutorial and reference book. And keyboard wizards will love the optimised keystroke alternatives to the menus. Some will even devise their own key layouts, using PipeDream's unique keyboard programmability.

**We've maintained 100% file and keystroke compatibility with Z88 PipeDream, so you can transfer files between the Z88 and your Archimedes.**

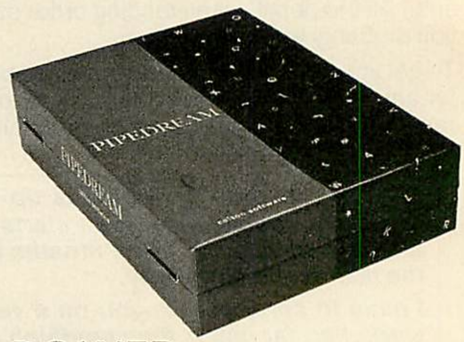
PipeDream is also 100% file compatible with PipeDream on the IBM PC, and Acornsoft's VIEW PROFESSIONAL for the BBC Microcomputer, so you could work at home on your BBC Microcomputer and take your files to the office on your Z88, to use on your Archimedes or IBM PC. No other software enables you to share your files with all these computers.

New facilities include:

- user-definable colour displays
- a comprehensive range of financial functions
- full usage of foreign characters including direct editing and printing
- loading and saving in several formats giving compatibility with Lotus 1-2-3
- linking files enabling you to pass the results of calculations between spreadsheets.

This in addition to all the facilities many thousands of Z88 PipeDream users have come to expect:

- fully wysiwyg display (what you see is what you get)
- many columns of formatted text on screen
- full spreadsheet power includes dates
- live calculations within formatted text
- flexible printing of special highlights such as underlining and bold text
- documents consisting of many separate files.




## POWER AT YOUR FINGERTIPS

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For more information or to order PipeDream cut out the coupon or phone us on 0954 211472

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# ACORNUSER

ISSUE No 76 NOVEMBER 1988

## COVER




**COVER FEATURE**

CAD packages – pages 130-133
Illustration by Paul Allen

## EDITORIAL

'Acorn's pull back into profit this year, plus its showing at Econet '88 and the PC Show are all encouraging signs.

At Econet '88, it demonstrated it hasn't forgotten networks, and the conference was seen as an improvement on last year.

The Acorn stand at the PC Show, a minnow next to the giants Amstrad, Commodore and Atari, was certainly crowded with potential paying customers. Acorn had sensibly invited hardware and software companies to share the stand, to back up its claim that Archimedes software is available.

It worked. But what might have put a few off was the presence of a solitary Master 128. Acorn are still selling more Masters than Arcs, and no-one should lose sight of the eight-bit machines. There'll be new applications and new customers for a good while yet.

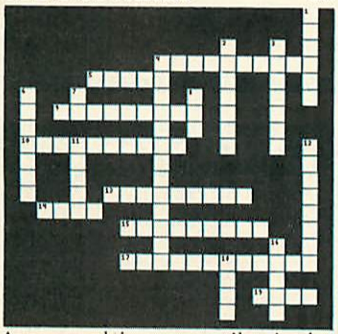
Graham Bell

## NEWS



## FEATURES

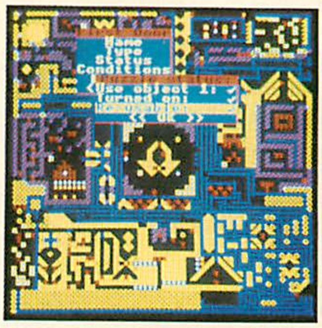






## REVIEWS







## EDUCATION







## REGULARS



## NEXT MONTH

Carol Atack tells the story of ARM, ARX and the Arc. Get near plotter-quality screen dumps on a model B, plus GKS graphics on the Arc. Drage and Evans show there are lots of adventures to play at school. And there's the Hints and Tips, Music and DTP pages.


**Editor** Graham Bell. **Technical Editor** Robert Miller. **Editorial Secretary** Christina Neal **Sub-Editor** Pauline McLernon. **Production Assistant** Teri North. **Art Editor** Liz Thompson. **Assistant Art Editor** Paul Holmes. **Ad Sales Controller** Seamus Geoghegan. **Sales Executives** Gregg Lorenz-Andreé, Gautam Paul. **Ad Production** David Noakes. **Publishing Services Manager** Sarah Bullard. **Merchandising Manager** Seran Anderson Haddick. **Group Editor** Tony Quinn. **Editorial Manager** Ellen Brush. **Publishing Director** Michael Potter. **Editorial Director** Christopher Ward.

ABC

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# NEWS

## In the black

Acorn has pulled itself out of the red, and turned in a profit of £711,000 for the first half of 1988, compared with a loss of almost a million this time last year. And chairman Elserino Piol says it's only the start.

Acorn's bank overdraft was cut by £1m, but sales went up only slightly to £20.5m. It is



Acorn MD; Harvey Coleman

only in the period since June that sales revenue for the Archimedes has exceeded that of the Master series.

The news prompted positive comment from analysts and journalists, but had little effect on the share price.

Major factors in the recovery were cost cutting at the end of 1987 (with the loss of nearly 50 jobs and the closure of the custom products department), plus growing Archimedes sales and continued good sales of the Master 128.

# Upgrade path for networks

UNIX could be part of the future for existing BBC micros in schools. SJ Research has developed a method of running UNIX and MS DOS programs on an Econet network.

In a lecture at Econet '88, Kim Spence-Jones of SJ Research outlined plans for the growth of existing Econet networks. They involve using a powerful '836' machine, a development of the IBM PC using an Intel 80386 processor, together with the UNIX multiuser operating system.

Normally, such a machine can support a number of users on separate terminals, each connected to the main machine by a serial link. The system SJ demonstrated allows you to attach the '386' machine to an Econet as an 'application server'. BBC micros on the network can be used as terminals to run UNIX or MS DOS programs, just as if they were connected via serial ports.

The network is used to link the machines. Keypresses on the terminals are transmitted to the '386' machine, and screen data is sent back. All processing and storage is done by the application server. The network's capacity is used to good effect when updating the BBC screens – only the part of the screen which has changed is transmitted.

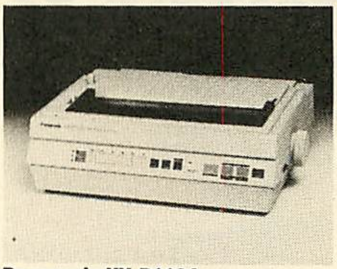
Spence-Jones sees this as part of a gradual upgrade path for schools, allowing them to make use of even just one or two powerful micros. Numbers could be increased as budgets allow – there would be no need to scrap existing equipment and replace it all at once.

■ An alternative method is to use *ArcShare* from European Communications Group. This is an 'application server' using Arcs on the network. It's been in use in the Computational Physics department of Imperial College for six months, and is ideal for sites where typical programs take hours to process. It can't be used for interactive applications like desktop publishing. Basic programs on normal BBC micros are written, tested and debugged. A completed program can be sent to the Arc for quick processing, and only the results are passed back to the BBC.

## Printers push forward

Panasonic and Citizen have added to their ranges of printers. The 24-pin Panasonic KX-P1124 (330) has five resident fonts and emulates the Epson LQ-800 or the IBM Proprinter.

Fanfold paper can be fed through the rear or the bottom of the machine, and it has both push-tractor and friction feeds. You can park continuous paper to feed a single sheet; it can take up to A3 size.



Panasonic KX-P1124

Citizen's new 180E is an update of the popular 120D, at under £200. For this, you get a choice of serial or parallel interface, tractor and friction feed, Epson and IBM emulation, and NLQ print.

## Schools in stereo

Armadillo Systems has added to its sound sampler range. The A448b is a stereo version of the A448 8-bit sampler, and it has a MIDI port option too. There's also the A616 16-bit sampler that gives CD-quality sound output. But it is expensive at a price of £1,149.

■ Cheshire local education authority has purchased 48 complete Hybrid Music systems to be used in a pilot study for teaching music in schools. It is expected that 36 of these systems will be used in the primary sector alone.

The purchase is the only music equipment to be bought so far using money from the Government's education support grant.

## Arc compiler

Book publisher Dabs Press is now turning its hand to Archimedes software. *ABC* is a BBC Basic compiler that takes most programs and turns them into superfast ARM machine code.

The compiler allows you to develop your program in normal, interpreted Basic, then compile it once it's complete. The software costs £100.

## News in brief

Aimed at the professional video industry, the GL2000P is an £805 genlock system and PAL encoder for the Master 128 from Interactive Media Resources. It enables you to add computer generated text and graphics to your video images, and then record the combined picture on videotape.

IMR also sell very high-quality PAL encoders that allow you to videotape the display from either Master or Archimedes computers, but not mix it with other video sources. These units cost £288.

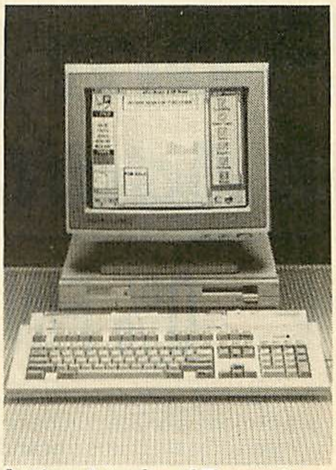
■ The Amstrad SM2400 is a four-standard modem which gives you V21 (300 baud), V22 (1200 baud), V22bis (2400 baud) and V23 (1200/75 Prestel) data rates. It is Hayes-compatible, so will work with standard comms software like Beebug's *Hearsay* or BBC Soft's *Modem Master*. But the real news is the price – £286 is a lot cheaper than equivalent modems from other comms manufacturers.

■ Arc owners wanting to have a go at 3D modelling can get *Euclid* from Ace Computing. It allows you to build complex solid 'objects' and scenes on screen. You can then view the scene from different angles, under different lighting conditions, and even produce animations. *Euclid* costs £45.

# Archimedes set for desktop publishing

*Acorn Desktop Publisher*, revealed at the PC Show, is an Archimedes version of GST's *Timeworks* desktop publishing software. It allows you to create fully illustrated leaflets, magazines or even whole books on screen, and then print them out. GST, who also wrote *First Word Plus*, already publish *Timeworks* for the IBM PC and the Atari ST.

The fully WIMP-controlled software allows you to design each page in terms of frames, by outlining columns, areas of the page where text will fit, where illustrations go and so on. Text can be read into the frames from disc, and formatted according to the width of the column. There's good control over the text font, size, justification, and typographical features like leading and kerning. Pictures can be imported from other drawing packages.



**Arc to get version of Timeworks**

Frames containing text and pictures can be moved or resized, and the page can be reformatted into the new layout. Because of the speed of the Arc, this process is much faster than with other versions of the *Timeworks* software.

*Acorn Desktop Publisher* is the first application to make use of the Arc's new RISC OS, so won't be available until April 1989. The screen display uses the anti-aliassed fonts extensively, and output can be to Postscript printers, to non-Postscript laser printers and to dot-matrix printers. It can also make use of the RISC OS multi-tasking. This means that you can use software such as *ARM Edit* or *ARM Draw* at the same time as *Desktop Publisher*, to draw illustrations, write headlines and so on. This is important, as the built-in editor and drawing facilities are fairly basic.




**TV quiz winners Julian Steele (left), Duncan Sinclair, Robert Wilson (right) and game host Debbie Greenwood, show off their prize for being 'First Class'. The team from Caterham School in Surrey beat off a challenge from Tring School in Hertfordshire in the final, and won an Archimedes 310.**

**The popular school quiz asks questions on general knowledge, and has space invader-type computer game contests.**

# Music system gets a boost

*by Ian Waugh*

BBC computer music innovator Hybrid Technology has been quiet for several months. But now it has given details of a new product planned for release in time for Christmas – the 'Music 5000 Junior' add-on synthesiser, which will cost well under £100.

The Junior's hardware is similar to the existing Music 5000, and must be plugged into BBC model B or Master 128 computers. But the software is very different. It's aim is to introduce even non-musicians to computer music.

The Junior features five different graphical, icon-controlled music editors, which show all available options on screen at once. The computer keyboard is used for step-time music input, and tape-recorder-like icon controls are used to move forwards and backwards through the 'score'. The editors all use high-resolution colour screen modes, and are designed to be almost foolproof in use. There's even a title editor to help produce title screens.

The software is on a 32k ROM chip. There are no modules to load from disc, so operation is very fast.

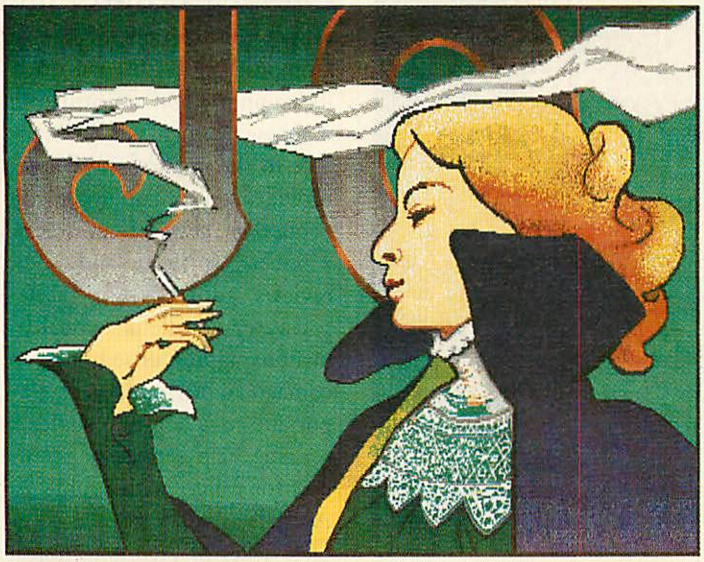
Experienced Music 5000 users cannot run *Ample* programs on the Junior. Nor can it accept music downloaded from sources such as Music City. Neither will it support the Music 4000 keyboard or the 2000 MIDI interface – but it will be upgradeable to full Music 5000 level, so they can all be added at a later stage.

## Network plan

At the Econet '88 conference at Newman College in Birmingham, Acorn launched an upgraded Filestore fileserver, discussed plans for linking Econet to more powerful network systems, like Ethernet, and previewed the Archimedes' RISC OS to those present.

There were lectures, demonstrations, plus a mini-exhibition of network hardware suppliers and educational software authors. Informal workshops in the evening included a network problem surgery.

Filestore is a network fileserver in a single box – you don't need to use a normal computer to run it. The base unit has two floppy disc drives that can be used for network storage, but it's better used with hard discs. New 40Mb and 60Mb hard disc units can be stacked onto the base unit giving as much as 240Mb of storage on a single fileserver.



## Art for Arc

Clares has launched *ProArtisan*, which it claims is the 'ultimate designer's palette for the Arc.

It's a mode 15, 256-colour version of *Artisan* (which uses only 16 colours). It uses the same menu and drawing tool system. But extra facilities such as smooth Bezier curve drawing, a cut and paste facility for irregular shapes instead of just rectangles, a font editor and a clever distortion facility are included. There are extra screen dumps for Integrex, Hewlett-Packard Paintjet and Laserjet printers. It needs an Arc 310 and costs £170.

## Telemap undergoes shake-up

Telemap, which runs Micronet, is undergoing another major shake up with the departure of its editor, the introduction of a business service and the scrapping of the paid telesoftware section – which will mean the end of downloading *Acorn User* monthly discs.

A free section is being set up to carry software for 16-bit machines like the Atari ST and Amiga as well as the BBC – part of Telemap's 'moving with the times'.

Telemap's Helen Sullivan described the new Interbusiness service as being of interest to any company, because of its ability to answer business questions within 24 hours. Specialists on tax, law and employment will be provided by the Legal Protection Group, and questions can be asked around the clock, seven days a week.

Micronet is looking at the possibilities of being able to order *Acorn User* discs and other software by electronic mail order.

In another move, the multi-player interactive adventure game *Shakes* is to be available on Telecom Gold, costing an extra 6.5p a minute on top of the Gold charges. But strangely, this premium is only charged during off-peak hours.



**Helen; hard at work**



**Richard; interested in programming**

## Winners go on holiday

*Acorn User*'s January competition winners – 12-year-old Helen McUillan and 11-year-old Richard Neal, were both awarded a place at Computer Park '88. It's a holiday at Grendon Hall in Northamptonshire, where computers and electronic equipment are over-used for two weeks each summer. The park is mainly BBC-based, but has a whole range of other machines to play with. Helen spent a lot of time in the workshop, building a User Port monitor. Richard dabbled in electronics but worked more on writing programs for the BBC micro – that is, in between advising on tactics for playing *Conqueror*.

Both winners said they enjoyed the week and would like to go again next year.

## CDS hits high street

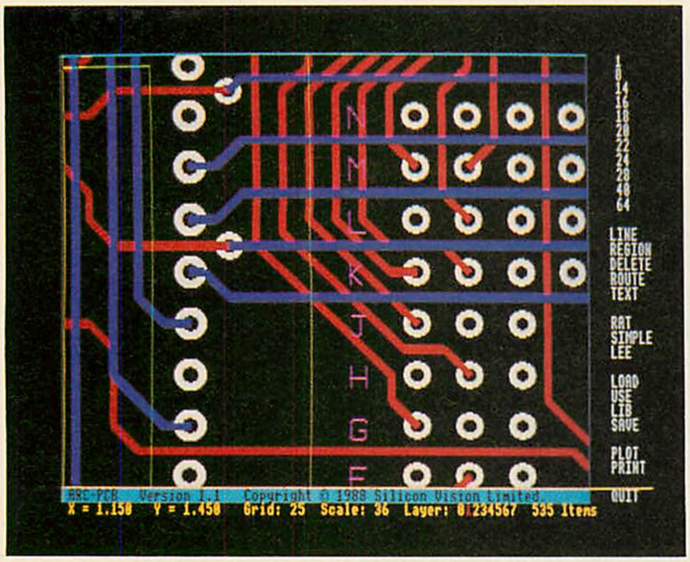
CDS Software are to re-release 15 of Superior Software's best games at budget prices. Classics like the original *Repton, Deathstar* and *Codename: Droid*, will be out on a dual BBC and Electron cassette.

Steve Hanson of Superior said, 'Our time is better spent on new games, but we hope that CDS can reach a good high street market.' The intention is that CDS distribute to shops like W H Smith, which have been reluctant to stock BBC micro titles in the past. The games will be available by November priced £2.99 each.

■ Superior has bought the Alligata games company. The joint Superior/Alligata label will be used on C64, Spectrum and Amstrad games.

## Pro libraries

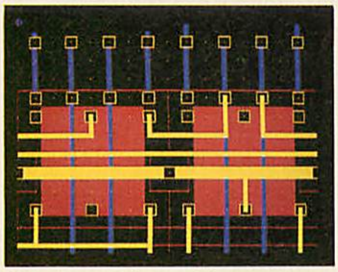
Micro-Librarian is aiming at libraries that want to store information on the Archimedes. The company originally wrote library software for the Master 128. Now there's a similar package for the Arc, claiming to offer speedy research data. *Micro Librarian Professional* for the Arc costs £345; an extra £230 pays for 'customising' to suit your individual needs.




**Silicon Vision's PCB design system for the Archimedes**

# Arc PCB pack

Electronic designers seeking a professional PCB design system should note the latest Arc-PCB application from Silicon Vision. Its £195 system, written specially for the Arc, aims to simplify the layout of circuit boards up to 32 inches square, with up to eight board layers, a fast graphical interface and full auto-routing to take away much of the hard work. There's also a £99 version which lacks only the autorouting option; and a demo disc for £5. Silicon Vision is also completing a Gate Array chip design teaching system.



**Gate Array chip teaching system**

## Fast modem prices fall

Small businesses and keen hackers could benefit from Miracom's lower prices. It has reduced prices on its WS 3000 Hayes-compatible modems. The V22 (1200 baud) model now costs £424 and V22bis (2400 baud) costs £569. The WS4000 Schools modem, which works at 300 baud and 1200/75 baud, falls to £132.

## Italian network

Like Britain had in the early 1980s, Italy has a national plan to put computers in every school. Students at the Vincenzo Comi accountancy college in Terano, near Milan, now benefit from an Econet system with a 20-megabyte filestore. Staff were impressed with Econet after seeing the system at the accountancy college in Abruzzi, and the art school at Argezzano.

## Corruption in high places

Firebird has released *Corruption*, the first native ARM code Magnetic Scrolls adventure for £24.95. *Corruption* places you in the cut-throat world of high flying executives, company BMW's and personal organisers. The text is exactly the same as the PC version. The excellent illustrations have been reproduced and the pull-down menus even have six holes for your organiser.

## THE COMMS COLUMN

■ At the recent Personal Computer show, Acorn made its support and information database, known as SID available to the public. The system provides an online magazine containing news about Acorn products, software and book reviews, downloadable telesoftware, bulletin boards, mailboxing, response frames to contact Acorn and, very important to a lot of people, a realistic help service is promised for callers with problems. As well as software, the complete texts of Acorn technical and application notes will be available for downloading.

A comms area of the board is run by Hugo Fiennes, sysop of last month's featured board The World Of Cryton, and author of *ArcTerm*. David Wild, former editor of Pascal-Link on Prestel will conduct the forum on programming languages, and other subject areas such as graphics are planned. Education users are also catered for, and there is plenty of information on the use and maintenance of networks.

It costs £10 per quarter to subscribe to SID, plus 8p per minute on-line charge. Three-month free trial subscriptions were on offer at the PC show. If you don't continue at the end of the trial period, you pay only for your line time, not the subscription. All mailboxing is free.

The service is Viewdata, and operates only at 1200/75 baud. Calls are made via the Fastrak access system, which offers local call access to nearly everywhere in the UK. A demonstration of the system is available on (0223) 243642 using standard Viewdata terminal software. Acorn's man in charge of SID is Phil Colmer who'll be starting a column in *Acorn User* next month. You can request further details on SID using the response frame on the demonstration.

■ Micronet has further eased access to its fantasy multi-user game *Shades*. It is now available to Telecom Gold users, as well as Prestel and direct-dial (38p/min) callers. The game is made available through a gateway from Gold, and costs 6.5p per minute on top of your other Gold charges. Contact Phil Godsell on 01-278 3143. Micronet's TeleTalk conferencing system has changed its name to DialTalk, after a prior claim to the former trademark.

■ Little has been heard of the comms specialist magazine, *Telelink*, since Database Publications sold the title to Marathon Videotex over a year ago. It has, however, been announced that the magazine is now being edited by John Wallbridge (chairman of the Bulletin Board Operators Association) and Steve Gold (Micromouse on Prestel and co-defendant in the famous Duke of Edinburgh Prestel mailbox hack case).

■ Farmlink on Prestel, the specialist area for farmers, has closed after the company behind it folded. Prestel is looking into the possibility of providing a replacement service.

■ Bulletin board of the month is ArcPort, a new board running on what looks like the first Archimedes-based host software. As you might expect, the board strongly features the Archimedes, and runs 6pm to 8am Monday to Saturday, and 24 hours on Sunday, on (0252) 737065. The sysop and author of the Archimedes host software is David Joyce, who can be contacted in the more conventional way on (0252) 737065.

■ If you have any comms news for David Atherton, you can write to him here at *Acorn User*, or via Prestel 942876210 and Telecom Gold 72: MAG11596.

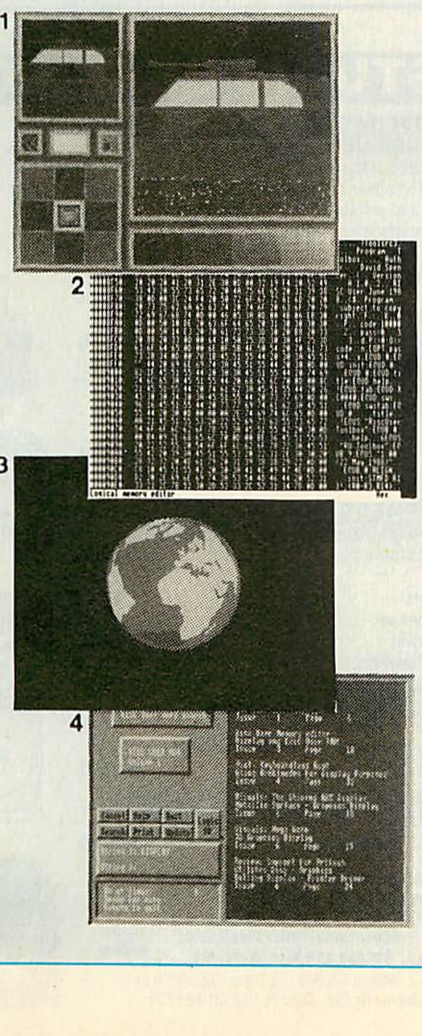
**David Atherton**

# RISC USER

## The Archimedes Magazine and Support Group




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**Altogether the items on this disc would be worth over £50 if bought separately.**

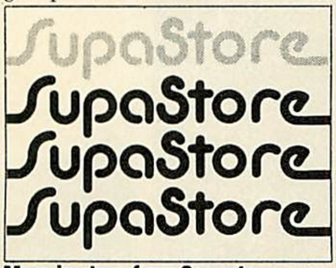
## This is what you've missed in volume1

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| Scrolling Memory Editor | 3 |
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■ ESM's *Supastore* database system has been upgraded. *Supastore Plus* contains an advanced report generator which enables a flexible page layout. The global field editor allows the same field to be changed simultaneously over a whole group of records, and the record deleter will delete whole groups. You can also compact a database to get back disc space used by deleted records.



**More in store from Supastore**

Transfer between DFS and ADFS has been made simpler, and two databases may now be merged to make larger files. Finally the import utility allows the user to read *View-Store, Quest* or *Grass* files.

■ Musicality Software publishes two music courses for the BBC B. The first, *Reading Music 1*, teaches and tests the rudiments of music assuming no prior knowledge. The second package, *Musical Dictation*, is an aural training course which tackles rhythm and pitch. The software is available on 40 or 80-track disc.

■ New from Newman College is the third version of its popular *Front Page* newspaper design package. *Front Page Special Edition* will only run on Master series machines, or on an Econet.

It has full wordprocessing facilities, with six fonts in three sizes. There are six predefined page layouts, each with a number of variants. Printer drivers for a number of machines are included, and a reduced size print-out is also available.

It costs £28.75 for a single copy or LEA licences may be obtained from Roger Keeling at Newman College.

# Mac link up

Apple is set to announce a series of products to improve the ability of the Macintosh to link to the BBC micro. This is part of a strategy to gain fuller acceptance for the Macintosh in schools.

Leading the move is a 'stack', running under the Mac graphical database *Hypercard*, to read BBC database files from *Quest, Key, Grass, Find* and *Inform* through a cable link.

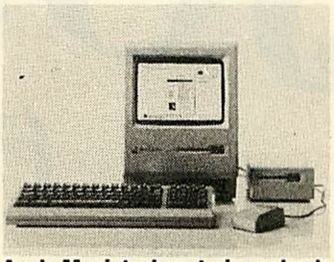
Software and interfaces from Human Computer Interface already allow BBC screen pictures to be transferred to the Mac, as well as *View* wordprocessor files. *View to Mac* is being enhanced to read from *Wordwise Plus* and *Interword* too.

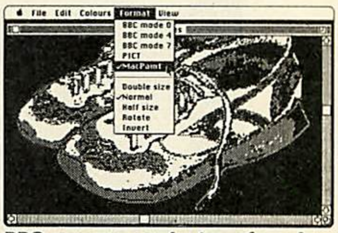
The *Hypercard* stack is already being distributed to education authorities and Apple's own regional information centres. It will be in the public domain and can be copied.

There will be an upgraded BBC Basic from HCI. This is being developed into a full BBC emulator, handling operating system commands.

All should be available in the spring, and will be demonstrated at the BETT'89 exhibition in January.

The moves coincide with tests by the National Council for Educational Technology to assess the capability of various micros to run BBC hardware and software.


**Apple Macintosh; entering schools**


**BBC screens can be transferred**

# Be king of the castle

The first of a suite of cross-curricular software from Data Design is *Designer Castles*. It allows children to study the elevation and plan of a castle, design its features using the available castle-building tools, and then print out the result – as a layout for a card model, complete with fold lines and glue tabs.

Another interesting feature is that *Designer Castles* files may be transmitted intact down TTNS. A datafile of castles already exists on the system.

The software was very well-received at a recent International Computers in History conference at Leeds. It is likely to be useful in topic work in primary schools, as well as GCSE History or CDT courses. The software costs £30 to education, otherwise £50, and includes discs, a manual and printware support ROM.

Next will be a *Villages* pack, to allow castle builders to create a village for their serfs.

# RISC OS amazes advisers

Acorn has unveiled its new operating system for the Archimedes, after months of denying its existence: see page 19 for full coverage.

It is claimed that, despite sporting a wide range of new features, the new operating system is practically 100 per cent compatible with existing Arc software. Advisers at a recent meeting with Acorn are reported to have been 'amazed'. One educational software developer asked, 'Will children really benefit from an ability to open more than one application at the same time? I suspect that this initiative will not benefit schools a great deal.' The question is, do schools need such a sophisticated product?

The meaning of RISC OS to educational users will only become apparent when software developers discover how many existing programs have been affected and whether they have set their horizons too low for new products.

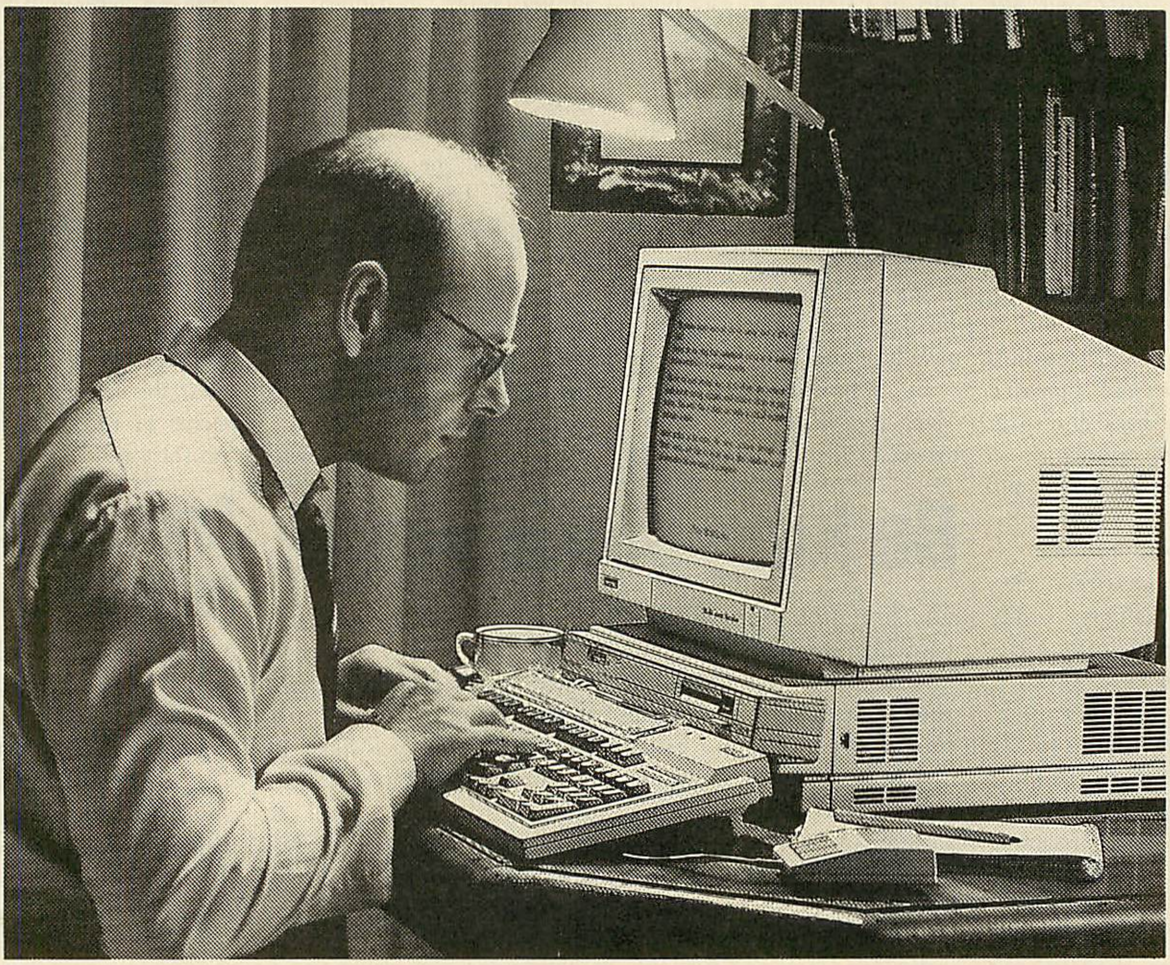
# Acorn still faithful

A large body of software available, or in development, for the Archimedes appears to be linked to education. So says a recent *Acorn User* survey. But closer scrutiny shows a substantial portion is 'ported' from the 8-bit machines and runs under the Arc's 6502 emulator. Only a small fraction have been improved to take advantage of the Arc's power.

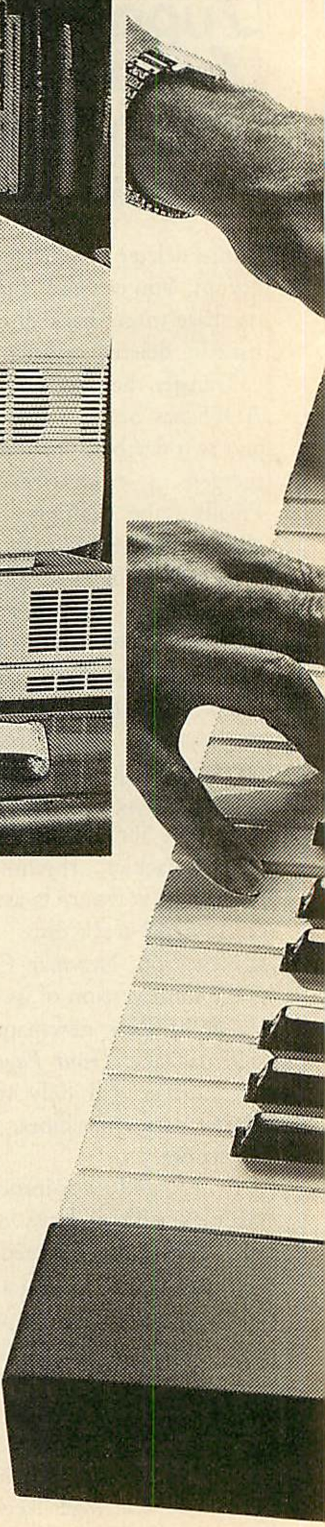
Specific new developments were few – the reason seemed to be a lack of confidence in the penetration of the hardware into the schools. Acorn is, however, collaborating with some software houses and local education authorities. Major projects on the use of Logotron's Archimedes Logo in secondary schools, and on 'pupil accessible resource-based learning environments' are moving ahead with Essex. A TVEI pilot project within ILEA is looking at CDT, Cambridgeshire is looking at ways of exploiting networks, and Berkshire is studying software emulation.

# JOURNALIS

# (What other micro has

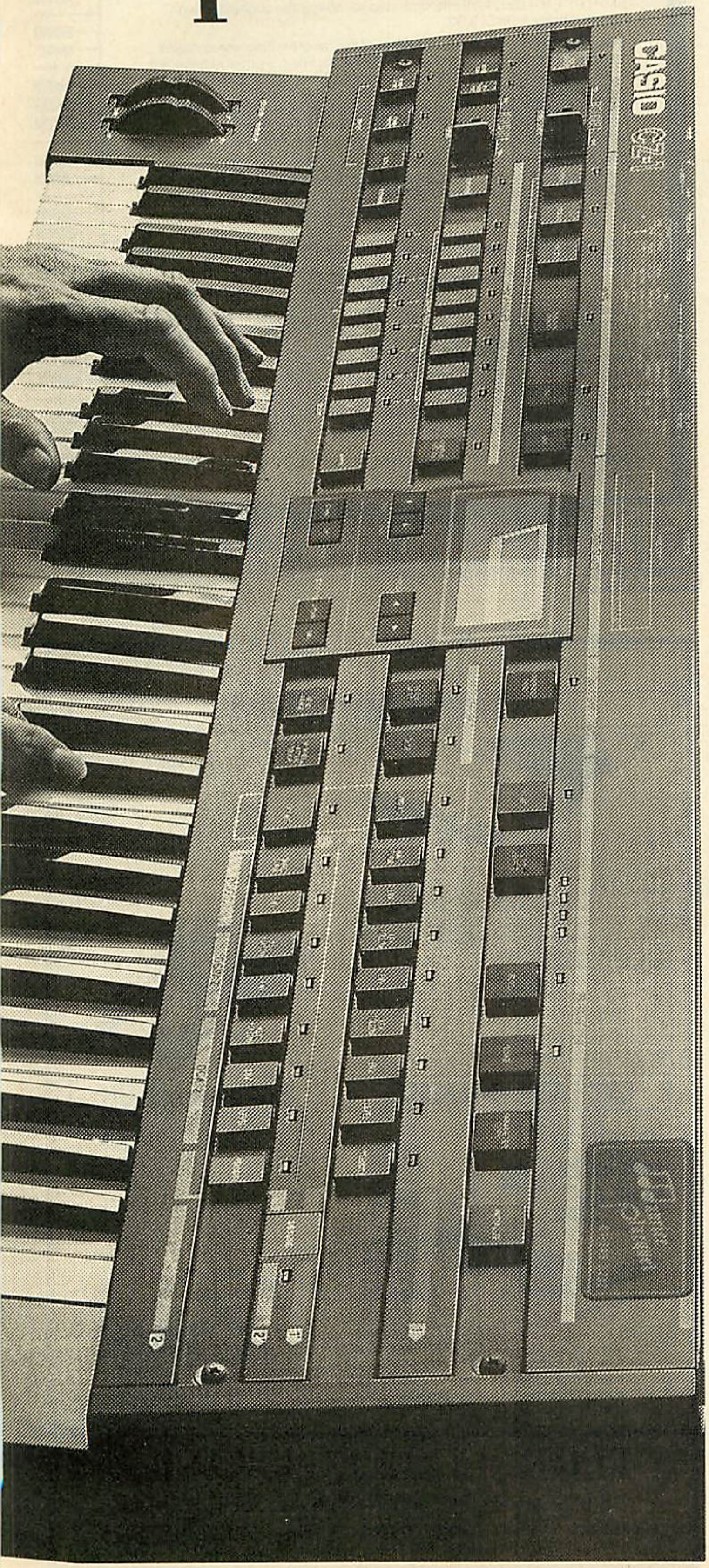


Whether you are producing a social club newsletter or writing your life story, the Archimedes system is simplicity itself to use, producing a crispness and clarity of image second to none.



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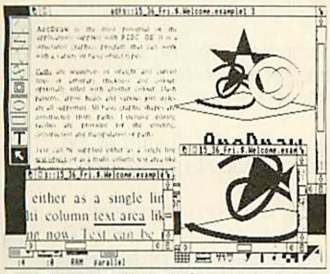
Acorn
The choice of experience.

# Welcome disc applications

There are three major applications on the RISC OS Welcome discs; *Arc Paint*, *Arc Draw* and *Arc Edit*. All three can be run at the same time if you have enough memory. Also featured are the *Lander* game, the 65Host emulator, demonstrations and tutorials.

*Arc Paint* is a mouse-controlled painting package that can be used to produce sprites. It's facilities don't quite match specialised art packages like *ProArtisan*.

*Arc Edit* is a text editor



**Arc Draw allows Bezier curves**

which can be used to produce short items of text. It can use the Arc's anti-aliassed fonts on screen, and can produce output to Postscript laser printers, to non-Postscript laser printers like the Hewlett-Packard Laserjet, and even to dot-matrix printers. In fact, these output options are part of the operating system, not of *Arc Edit*, so the facilities should be available to most programs.

*Arc Draw* is the most impressive of the three Welcome applications. It is similar to CAD packages like *AutoSketch*. You can even import drawings in the DXF file format from *AutoCAD* and other line-drawing packages. As well as the usual text, line, circle, arc and box functions, smooth curves can be plotted with the new Bezier splines. And again output can be sent to Postscript or non-Postscript laser or dot-matrix printers.

# RISC OS upgrades

Acorn previewed the new Archimedes operating system, now known as RISC Operating System 2.0, at the Econet '88 conference in Birmingham, and announced it publicly two days later at the PC Show.

The new operating system chips will be available from April 1989. Upgrades for existing Arcs are planned to cost around £50, with discounts for educational buyers. New Arcs will come with the chips as standard after April.

The RISC OS chips replace the four existing Arthur ROMs. The upgrade will also include two Welcome discs and a new manual.

The most important part of RISC OS involves multi-tasking. This allows the computer to appear to work on two programs at once – so a long program can keep running



**Desktop and task control panel**

while you work on something else. In practice, it allows you to be using a program, say a desktop publishing package, and to call up a separate text editor in a screen window to write notes, without saving your DTP work. The DTP program continues to run in its own window. Text can also be moved from the editor straight into the DTP window, without saving it to disc first. And the desktop facilities remain available all the time.

Demonstrations at the show involved several animated displays on screen at once. But multi-tasking takes a great deal of memory, and even 1Mb machines can run short of RAM.

The system contains a number of other extensions to Arthur 1.2 – most of the improvements concern the graphics. There is also a new 6502 emulator, called 65Host, which overcomes many of the problems of the current emulator – it can deal with some 'illegal' programming methods, even running many games that directly access the screen.

## Multi-tasking plus better graphics

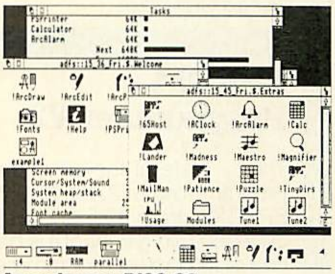
The multi-tasking in RISC OS is 'non pre-emptive' – or co-operative. This means that the system will never take control away from your program forcibly. The approach is similar to that taken by the Multi-Finder system on the Macintosh.

It relies on your program calling the Wimp Poll routine regularly, so that WIMP events can be distributed between whatever programs are running. Programs that don't use the WIMP system can't be multi-tasked, but on specially-written programs the results are impressive. Priorities can be allocated to different tasks, and the amount of memory and sprite size can be altered from a control panel display.

The window and sprite system now works in all modes, and moving a window drags the whole box, not just a dotted outline as in Arthur 1.2.

The sprite plotting system allows sprites to be rescaled and plotted at any size in any mode – the operating system attempts to match the colours of a sprite by dithering in modes with too few colours – even mode 0. And the 132-column modes 16 and 17 now support graphics as well as text; this makes advanced terminal emulation possible.

There are extra PLOT commands to draw Bezier splines – these are smooth curves often used in CAD programs and font designs, and were explained by George Blanchard in September's *Acorn User*.



**Acorn's new RISC OS**

The ADFS has been updated, with an improved 800k disc format that allows bad sectors on the disc to be skipped over. There is now a fully-fledged RAM filing system too, with its own icon on the menu bar. And output can be saved 'to a sprite' – the sprite can then be dragged into another application and 'loaded'.

To make room for the extensions, the Basic Editor and HardCopy modules have been removed from the ROMs. But the Basic Editor is on the Welcome disc and can be loaded into RAM.

# Meet the Morley Family...

## Teletext Adapter

The adapter is housed in a plastic disc drive style case, similar in colour to the BBC micro. It connects to the User Port via a 4-way ribbon cable and can take its power either from the computer or from our optional power supply.
The unit comes with the ATS (advanced teletext software) written for us by the BBC. The HOLD PAGE and REVEAL features are implemented, and pages can be saved to disc under your own file names.
Telesoftware is catalogued and selected from the Menu page, and the programs are easily downloaded.
THIS IS THE BIGGEST SELLING TELETEXT ADAPTER CURRENTLY IN PRODUCTION WORLD-WIDE, AND COMES WITH A FULL MONEY BACK SATISFACTION GUARANTEE.

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| Adapter BBC/Master | £104.20 |
| Adapter Compact | £120.00 |
| Adapter RML Nimbus | £104.20 |
| Optional Power supply | £8.80 |
| Teletext Utility Disc | £5.20 |

## EPROM Programmer V2

This state-of-the-art unit, allows programming of 2764, 27128 and 27256 EPROMS both 12.5 and 21 volt. Totally under software control it is believed to be one of the fastest programmers available today.
The comprehensive user-friendly software included in the package has two main parts. The first allows EPROMS to be read, programmed, verified, and edited, also allowing a ROM image to be loaded or saved. The second is a full ROM management system in its own right, which has a host of useful features and routines, such as KILL and RESURRECT ROM to disable or enable a sideways ROM, dump ROM image to buffer or disc, move ROM image in buffer to sideways RAM, and VIEW-SEARCH any sideways ROM.

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Eprom programmer utility disc – Put all your favourite routines into Sideways Rom, both BASIC and M/Code allows multiple programmes up to 16k with separate * commands for initialisation and help.

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## Master Board "AA"

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*A staggering 32 ROM images installed and accessible at any time.*
Included in the package is a utility ROM which has many useful features including a clever file transfer program that transfers files between DFS and ADFS formats or vice versa.

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## The Latest Arrival...

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## Software

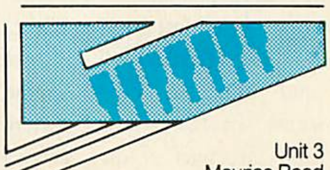
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## Master Smart Cartridge

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The Smart Cartridge will at the press of a button halt a program running in memory and execute any one of a host of useful built-in, or user defined procedures, and once completed will return to the program and continue where it left off. The only limiting factor with this device is the programmers imagination.
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*Screen dump (any mode) to printer or disc.
*Allows most protected software to be backed-up including tape to disc and disc to tape.
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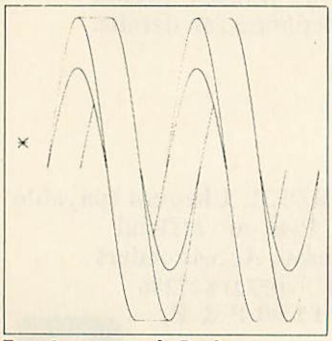
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**Master Speech Cartridge**

# Plotting a place for low prices

The COMX PL80 plotter is a lightly built and cheap-looking four-colour plotter, but it belies its looks. It uses tiny ballpoint pens to draw on rolls of paper, or oil-based pens on transparent acetate sheet.



**Easy to program in Basic**

In use, it is slow and lines are noticeably jagged, but it is surprisingly accurate. It is important that a plotter can return to a previous point after drawing – say returning to a corner to draw an adjoining side – and the COMX does this well. The dump shows a cross plotted before and after the spring: they overlap near-perfectly. And you can even print text, although this is an extremely slow process as each letter has to be drawn. However, at just under £200, there's little competition for the plotter.

The major problem is software. It's akin to having a non-Epson-compatible dot-matrix printer – it isn't supported by any of the current range of CAD software for the BBC or Arc; you have to program it in Basic yourself. This is not easy for the non-technical.

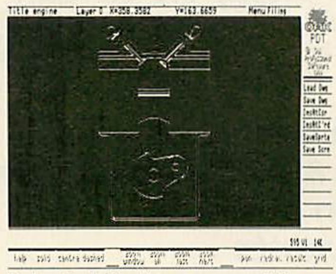
This problem will only be solved when a new model, compatible with Hewlett-Packard Graphics Language (a well supported plotter standard), is ready. This is promised by Christmas.

Graham Bell

# Tool for design

Oak's *Parametric Design Tool* (PDT), is at the simplest level, an Archimedes CAD package similar to *AutoSketch*. The program allows lines, circles, arcs and text to be entered and edited in the usual way. Objects can also be dimensioned in a number of ways. Facilities for zooming and panning across your diagram are available. Diagrams can be dumped to a dot-matrix printer, or a plotter.

*PDT* has a number of unique features that set it head and shoulders above other packages currently available. Objects are not stored in terms of their absolute positions, instead their relationship between objects is used. This means that if two circles are drawn with a tangential line connecting them and one of the circles is altered in any way, the tangent is redrawn to match the new configuration. In addition it is possible to alter dimensions by typing in expressions. These two facilities enable complex mechanical linkages to be set up and simulated. Although it is expensive at £339.25, *PDT* is well worth a look.



**Animated displays are possible**

Dave Lawrence

# A perfect mix

The latest arrival on the desktop publishing scene is *Pixel Perfect* from AVP Computing – a competently written piece of software that should secure itself a share of an already well-served market.

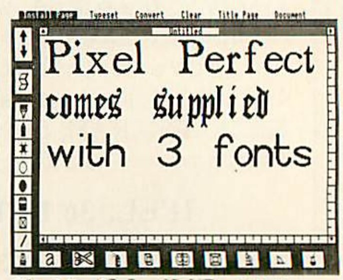
All the usual DTP features are available. Pictures and text may be freely mixed on your page and the refreshingly clear screen layout helps you to pick up the basics with minimum reference to the manual.

You'll need to prepare your text on a 'real' wordprocessor, as the built-in text entry facilities are minimal. Both *View* and *WordWise* files can be imported though, so most tastes will be catered for.

A modest but well-drawn picture library can be added for a little over £22 – a little expensive but it is a good short-cut to producing 'professional-looking' work.

On the negative side there are a few unpleasant features.

Perhaps the most infuriating of these is that your work is not automatically saved. This means that if you don't remember to commit your handiwork to disc, it will be thrown away as you scroll down the page.

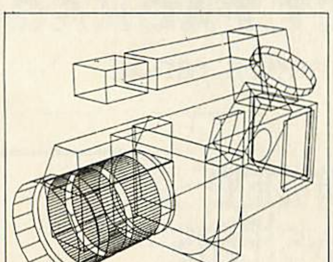



***Pixel Perfect*; competent DTP**

*Pixel Perfect* should prove a useful tool in the preparation of newsletters, school newspapers and the like. At a little over £45 including VAT, the package is not cheap but is fair value for money in my opinion.

Dave Acton

# With a view to CAD



***ViewCad*; reasonable value**

*ViewCad*, no relation to the *View* family, is a program marketed by Portsmouth College of Art, Design and FE for generating three-dimensional wire-frame images.

The program is a series of overlay modules on disc, and it also needs either an AMX *Art* or *SuperArt* ROM. It can only be used on a BBC model B with a 6502 Second Processor or a Master Turbo.

*ViewCad* is capable of producing very high quality drawings. But at present the software only supports the Graphtec MP1000 and MP3200 plotters. An Epson dot-matrix screen dump is also provided, but this would only be suitable for instructional purposes. As the program is written in Basic, customising it for other plotters such as the 'Plotmate' series will not be too difficult.

*ViewCad* should have applications in areas like industrial design and it's particularly suitable for Craft, Design and Technology work in schools and colleges. It makes good use of a WIMP style environment.

If you already have a second processor and either of the AMX ROMs, *ViewCad* represents good value for money at only £10.35. But if you don't have these, then other 3-D drawing packages should be considered first.

Dave Futcher

## Diary dates

**October 11-13.** Computer Graphics '88, Wembley Exhibition Centre. Tel: Debbie Gale, Blenheim Online, Pinner, Middx, 01-868 4466.
**October 11-13.** British Laboratory Week, Olympia Exhibition Centre, Hammersmith, London W14. Tel: Jane McAteer 01-833 3441.
**October 13-14.** Exploitable Technology '88. Gloucester Hotel, London. Tel: Margarette Karn, Butterworth Scientific, (0483) 300966.
**October 13-15.** Desktop Publishing Show, Business Design Centre, London N1. Tel: Christine Lees (0625) 878888.
**November 8-9.** British Computer Society's Computer & Exhibition Conferences for the Disabled. GEPB, Sudbury House, Newgate St, London EC1. Tel: Pat Guntrip (0277) 227364.
**November 8-10.** National Conference & Exhibition on Learning and Technology, Wembley Conference Centre, London. Tel: Tessa Barry 01-727 1929.
**November 10-12.** Design & Technology Exhibition, National Exhibition Centre, Birmingham. Tel: David Bennett, (04252) 72711.
**November 11-13.** *Micro User* Show, New Horticultural Hall, London SW1. Tel: Database Exhibitions, (0625) 87992.
**November 15-17.** Techmart Exhibition, National Exhibition Centre, Birmingham. Tel: Carole Jackson, 01-834 1717.
**November 17.** Conference & Exhibition on Advanced Technology & Learning and New Directions in Learning, Doncaster Conference Centre. Tel: Anne Swainston, Resource, (0302) 63784.

# Repton winners

Congratulations to Alistair Clark from Glasgow, the winner of our August *Repton* competition. Alistair named each game correctly, and wins our unique five-foot cuddly Repton. The thirty runners up each receive a game of their choice from Superior Software's latest catalogue – we've notified you all by post. The correct answers were:

1-E, 2-A, 3-D, 4-F, 5-C, 6-D, 7-F, 8-B, 9-E.

# Blunders from October

October's Top of the List to produce double-height and double-width text was missed off the contents page. The listing can be used either as a stand alone utility or combined with Joe's Ideas Processor to speed up some of the display routines. The listing and instructions for adding the routines to the Joe's program appeared on page 94.

■ A common mistake when typing in programs is missing out essential spaces. We've had a number of phone calls asking why seemingly small programs give a 'Disc Full' error when saving. For example, line 1980 of the Microspacing listing in September's issue said:

```
1980 PROCoscli("SAVE MI
CROSP "+STR$~code+" +100
40C 400")
```

It is very easy to miss the space between the 100 and the 40C; this then attempts to save a file just over a megabyte long!

The final parameters should read:

```
+100 40C 400
```

which saves 256 bytes.

■ The address of Margolis Systems, who produce *Comm Plus*, was missed from the Comms Column. It is: Margolis and Co, 105 Founding Court, Brunswick Centre, Marchmont Street, London WC1N 1AN. It can also be contacted on Prestel mailbox 018379789.

■ In October, we said that Great Elm services produce 'World puzzles'; that should be 'Word puzzle games' for both Beeb and Electron users. Call (0373) 812275: for a catalogue.

## Contacts

**Ace Computing,** 27 Victoria Road, Cambridge CB1 2LG; tel: (9223) 462212
**Armadillo Systems,** 17 Glasdon Road, Uppingham, Leicestershire LE15 9PX; tel: (0572) 822499
**CDS Software,** CDS House, Beckett Road, Doncaster DN2 4AD
**Computer Park,** 25 Bridge Street, Rothwell, Kettering, Northants NN14 2JW
**COMX,** Chemilab Business Systems, 91a North Approach, Watford WP2 6EL.
**Data Design,** Gowan Bank, 3 Botham Hall Road, Longwood, Huddersfield, HD3 4RJ; tel: (0484) 653176
**European Communications Group,** Unit 15, St Georges Industrial Estate, Richmond Road, Kingston, Surrey KT2 5BQ
**Firebird,** Telecomsoft, First floor, 64-76 New Oxford Street, London WC1A 1PS
**Human Computer Interface,** 11 Brunswick Walk, Cambridge CB5 8DH; tel: (0223) 314934
**Interactive Media Resources,** 8 North Street, Wolverhampton, West Midlands WV1 1RD; tel: (0902) 25444
**Micro Librarian System,** Stanley Cottage, Ridge End Fold, Marple, Stockport, Cheshire SK6 7EX; tel: 061-449 9357
**Miracom,** Hadleigh Road Industrial Estate, Ipswich, IP2 0HB **Musicality Software,** 15 Cheddington Road, Edmonton, London N18 1LY
**Portsmouth College of Art, Design and FE,** Winston Churchill Avenue, Portsmouth, Hampshire PO1 2DJ.
**Silicon Vision,** Signal House, Lyon Road, Harrow, Middlesex HA1 2AG; tel: 01-422 2274

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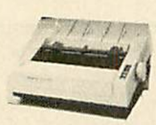
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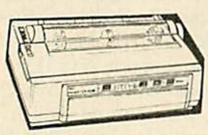


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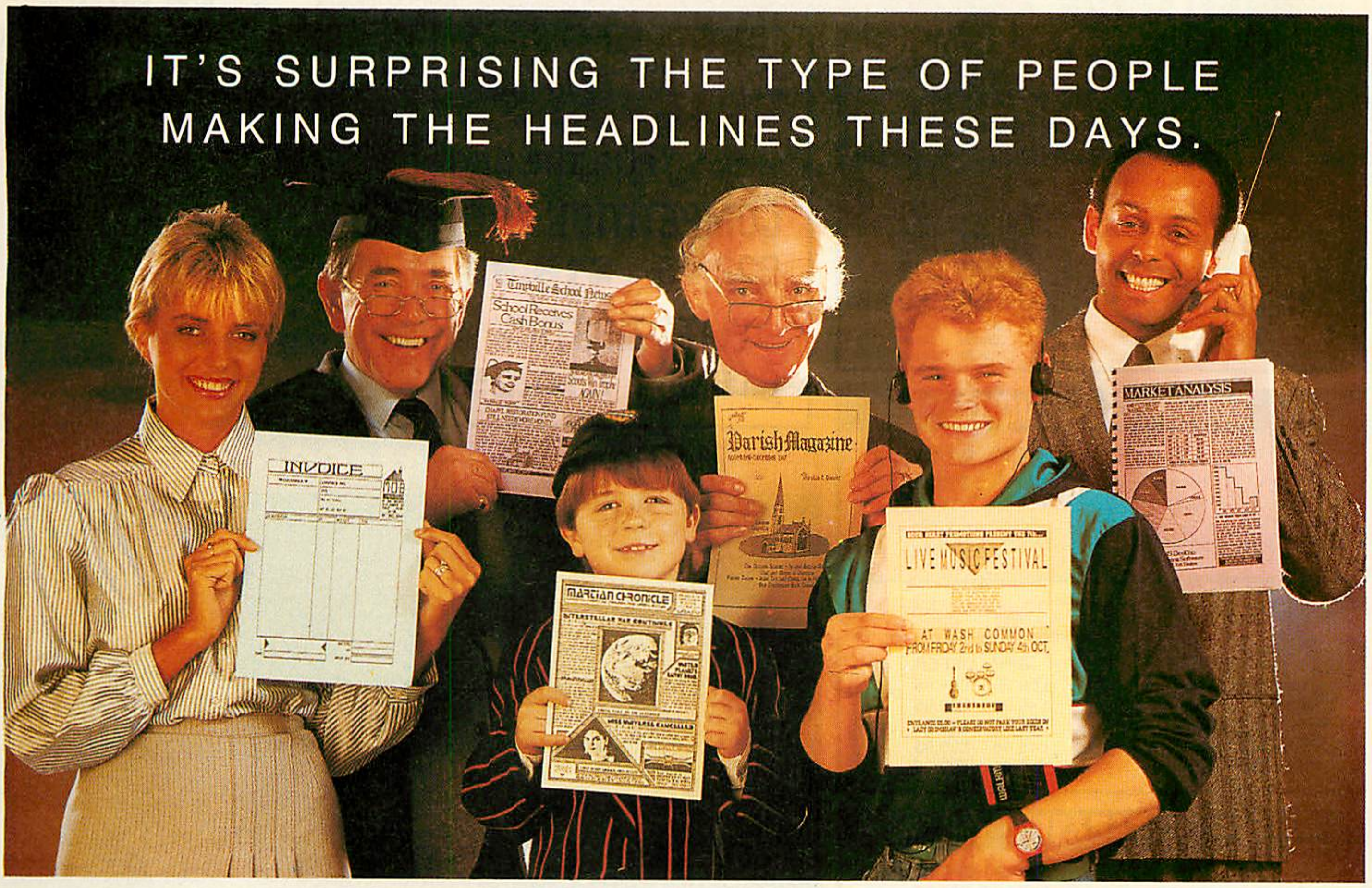
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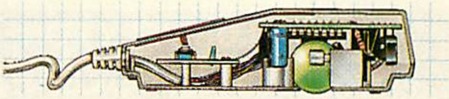
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| ISO Pascal | £113.85 | £99.95 |
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| Logistix | £113.85 | £99.95 |
| Minotaur | £14.95 | £11.95 |
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| Wordwise + | £23.00 | £19.95 |
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| Overview | £78.45 |
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| System Delta | £54.95 |
| Fleet St Editor (State 40 or 80t) | £31.95 |
| Fonts & Graphics (State 40 or 80t) | £10.99 |
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| Pagemaker | £39.95 |
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| Play It Again Sam 2 | £7.45 | £9.50 | £11.50 |
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# TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177 Fax: 01-452 1500
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## ARCHIMEDES, BBC COMPUTERS & ECONET REFERRAL CENTRE

### 300 & 400 SERIES

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|---|---|
| Archimedes 305 Basic | £685(a) |
| Archimedes 310 Basic | £799(a) |
| Archimedes 440 Basic | £2,399(a) |
| Acorn Mono Monitor* | £60(a) |
| Acorn Colour Monitor* | £220(a) |
| Philips CM8833 Col Monitor* | £210(a) |
| PC Emulator Software* | £60(b) |

**Prices applicable only when purchased with the computer*

### ADD-ONS

| | |
|---|---|
| 0.5Mb Ram upgrade kit (for 305) | £144(b) |
| 2nd Floppy Drive (305, 310) | £118(b) |
| Backplane for 2 podules | £37(c) |
| Atom wide Backplane 4 slots | £49(c) |
| Cooling Fan for AW Backplane | £10(d) |
| I/O Podule | £80(c) |
| 20Mb Hard disc + podule | £469(a) |
| Acorn ROM Podule | £55(c) |
| CC ROM Podule | £45(c) |
| Midi Addon to I/O | £37(c) |
| Midi Expansion Card | £66(c) |
| Econet Network Module | £43(d) |
| Archimedes Printer Lead | £7(d) |
| Archimedes Colour Monitor Lead | £7.50(d) |
| IEEE Interface Podule | £283(b) |
| 16 Bit Parallel I.O Card | £195(b) |
| Dual RS232 Card | £195(b) |
| Armadillo Sound Sampler | £105(b) |
| Fourier Transform Software | £40(d) |
| ARC/BBC Serial Link | £25(d) |
| ARC External Drive Adaptor | £30(d) |
| External 5.25 Drive | £104(b) |

### BOOKS: *(no VAT)*

| | |
|---|---|
| Arc. Ref Manual | £29(b) |
| Arc. Assembly Lang. Prog. (DABS) | £14.95(b) |
| Inside Autosketch | £15(b) |

### SOFTWARE:

| | |
|---|---|
| PC Emulator Version 1.20 *(includes MS-DOS 3.2)* | £99(d) |

### LANGUAGES:

| | | | |
|---|---|---|---|
| ANSI C | £95(c) | ISO PASCAL | £95(c) |
| Prolog X | £181(b) | FORTRAN 77 | £95(c) |
| LISP | £181(b) | COMAL | POA |

### PROGRAMMERS TOOLS:

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| TWIN *Editor* | £29(d) |
| Toolkit Plus Module | £41(d) |
| Software Dev T/Box | POA |
| Software Dev Debug T/box | POA |
| Archimedes Assembler | £199(b) |

### WORDPROCESSORS

| | | | |
|---|---|---|---|
| First Word Plus | £79(d) | View SKM31 (e) | £47(d) |
| Graphics Writer | £27(d) | Interword (e) | £35(d) |
| PipeDream | £99(d) | Wordwise + | £20(d) |

### SPREADSHEETS

| | |
|---|---|
| Logistix *(Includes spreadsheet/database/timesheets/graphics)* | £95(d) |
| Matrix 3D *(3 Dimensional s/sheet with 19k col, 10k row & 100 pages)* | £79(c) |

| | | | |
|---|---|---|---|
| Sigmasheet | £59(d) | Viewsheet SKM7 (e) | £47(d) |
| Intersheet (e) | £35(d) | | |

### DATABASES

| | | | |
|---|---|---|---|
| Deltabase | £26(d) | Viewstore SKM07(e) | £47(d) |
| System Delta+ | £57(c) | Alphabase | £39(d) |
| Prog Ref Guide | £26(c) | | |

| | |
|---|---|
| Support modules for System Delta Plus each | £35(d) |
| CC MEGA 3 For Arc | £79(c) |

### ACCOUNTING SOFTWARE

| | |
|---|---|
| Minerva's suite 5 Modules (ea) | £54(d) |

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## Special Offer
### FREE £115 inc vat VOUCHER

with every Archimedes model 310 and 440 purchased from us.
The voucher can be redeemed against any future purchase from us (inc Arc monitor, PC Emulator (at £60), discs, cables, paper etc.)
**OR**
Autosketch CAD package, Inside Autosketch book & 2 boxes of 3M 3.5" DS Discs.

Additionally we will offer discounts up to 10% on Archimedes hardware stocked by us.

### GRAPHICS/ART/CAD

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|---|---|---|---|
| Artisan | £30(d) | GammaPlot | £30(d) |
| Artisan Support | £17(d) | System GammaPlus | £59(d) |
| Autosketch | £69(d) | Interchart (e) | £25(d) |
| Presenter | £24(d) | Prof Artisan | £POA |

### GAMES:

| | | | |
|---|---|---|---|
| Zarch | £17(d) | Minotaur | £11(d) |
| Hoverbod | £13(d) | Missile Control | £13(d) |
| Conqueror | £24.95(d) | Enthar Seven | £29.00(d) |
| Orion | £13(d) | Freddy's Folly | £13(d) |

| | |
|---|---|
| Dust cover for Archimedes systems | £12.50(d) |

Software packages marked with (e) run under 6502 emulated mode.
*Please check on availability of some of the above packages*

### ECONET ACCESSORIES

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| **Acorn Filestore E01/E20** At Reduced price | £999(2×a) |

*(includes 2 × 3.5" Drives + 20Mb Drive FS software)*

**New Acorn Filestore to be released soon. Phone for details**

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| ECOLINK Card | £299(b) |

*Full spec on request*
(PX/XT/AT interface card for connection to Econet network)

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|---|---|---|---|
| Econet Starter Kit | £85(b) | Econet Bridge | £174(b) |
| Econet Socket Set | £29(c) | Printer Server Rom | £41(d) |
| File Server Level II | £75(b) | 10 Station Lead Set | £26(d) |
| Master FS Utility Disc | £17.25(d) | | |

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***To be launched soon***
The most comprehensive CAD system for the Master. Host of innovative features for creating complex drawings, pcb layouts, sketches etc. Virtually no restrictions on drawing sizes. On screen scaling for plotters, variety of screen dumps for compatible printers.

**FREE**
evaluation on disc available. The disc contains operating instructions and will perform as release version except for file functions.

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**We include *free* Educational/Fun software bundle from BBC Publications range (RRP £40) and a STARdataBASE package worth another £40.**

| | |
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| **ADC06** Turbo 65C102 Module | £115(b) |
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includes PC compatible DOS+ & Gem Suite.

| | | | |
|---|---|---|---|
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| ADJ22 Ref Manual I | £14(c) | ADJ23 Ref Manual II | £14(c) |
| View User Guide | £8.50(d) | V/sheet User Guide | £8.50(d) |
| TRC2 ROM Cart | £7.50(d) | TRC4 4ROM Cartridge | £11(d) |
| TRC32 32K RAM Cart. | £21(d) | Master Dust Cover | £4.75(d) |

| | |
|---|---|
| Acorn IEEE Interface (for B, B+ Master) | £265(b) |
| Universal CoProc Adapter | £49(b) |
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(Allow £5 extra if you would like us to fit the card for you)
512 upgrade includes 80186 processor with 512K RAM, DOS+, GEM Suite (Desk Top, Paint & Write) and Mouse
*This offer valid while stocks last.*
*Ask for our list of DOS software compatible with 512.*

**CANON PW1080A PRINTER including BBC Master Lead**
**£149(a)**

### MASTER COMPACT

128K RAM, 640K 3.5" DS Drive + Educ software and our bundled Educ/Fun package included

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| **SYSTEM 1** Entry System | £310(a) |
| **SYSTEM 2** with 12" Mono Monitor | £365(2×a) |
| **SYSTEM 3** with 14" Col Monitor | £475(2×a) |

| | | | |
|---|---|---|---|
| 2nd Drive Kit | £90(c) | Serial Kit | £25(d) |
| Mertec Adaptor | £35(c) | TV Modulator | £26(d) |
| Ext Drive Adaptor | £9(d) | Printer Lead | £7(d) |

### UPGRADE KITS

| | | | |
|---|---|---|---|
| 1.20S ROM | £15(d) | ADFS ROM | £26(d) |
| DNFS ROM | £19(d) | 1770 DFS Kit | £49(d) |
| BASIC II ROM | £22.50(d) | Econet Kit | £55(d) |

### EPROMS/RAMS

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|---|---|---|---|
| 2764-25 | £2.80 | 27256-25 | £6 |
| 27128-25 (12.5vVpp) | £4.50 | 27128-25 (21vVpp) | £6 |
| 27512-25 | £9 | 6264LP-15 | £6 |

*These prices subject to change* (Carriage code d)

### RAM/ROM EXPANSION

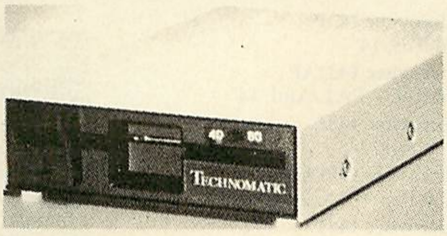
| | |
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| **ATPL Board** for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms +2*8K RAMS | £37(c) |
| ATPL Battery backup kit | £18(d) |
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All prices ex VAT and subject to change without notice. See page 5 for Carriage Charges.

# TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

# TECHNOMATIC DISC DRIVES




**TS 400**



**PD 800P**

For users who do not need 40/80 switching capability, please specify as such and add suffix **N** on our product code. Drive price will be reduced by £5/mechanism.

A range of high quality high performance drives to meet the needs of all BBC Micro Users.

All drives fitted with high quality, slim line Mitsubishi drive mechanism and necessary cables.

*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering fast track access and head setting times. Our confidence in their quality enables us to offer a **two year parts and labour warranty** on these mechanisms without any extra charge.

*5.25″ floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with a suitably fused 13A moulded plug.

*TECHNOMATIC drives stand out from other drives because of the high quality of construction and use of reliable switchmode power supply units on dual drives.

**5.25″ Single Drives 40/80 switchable:**

| | |
|---|---|
| **TS400** 400K/640K | **£90(b)** |
| **PS400** 400K/640K with integral mains power supply | **£101(b)** |

**5.25″ Dual Drives 40/80 switchable:**

| | |
|---|---|
| **TD800** 800K/1280K | **£170(a)** |
| **PD800** 800K/1280K with integral mains power supply | **£190(a)** |
| **PD800P** 800K/1280K with integral mainspower supply and monitor stand | **£209(a)** |

**3.5″ 80T DS Drives:**

| | |
|---|---|
| **TS351** single 400K/640K | **£69(b)** |
| **PS351** 3.5″ single drive with integral mains power supply in a 5.25″ case. | **£85(b)** |
| **TD352** Dual 800K/1280K | **£126(b)** |
| **PD352** 3.5″ dual drive with integral mains power supply in a 5.25″ case. | **£149(b)** |

**Combo Drives (5.25″ & 3.5″ drives)**

| | |
|---|---|
| **PD853** with integral psu | **£175(a)** |
| **PD853P** with integral psu | **£195(a)** |

**DISC DRIVE MULTIPLEXER**

***For Master, B, B+ and any DFS/ADFS***

| | |
|---|---|
| **TDM2** Two computers/one drive unit | **£65(b)** |
| **TDM4** Four computers/one drive unit | **£115(b)** |

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Technomatic offer the most popular range of Winchester drives for BBC micro systems at competitive prices. The drives are fully compatible with Acorn ADFS system. Fan cooled switch mode power supply ensure efficient and reliable operation. Combination of floppy and winchester drives in our elegant plinth housing provides an ideal solution for need to have large storage and ease of transferring data to floppies.

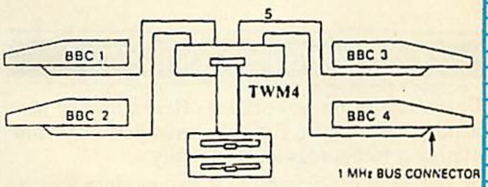
Technomatic front end utility for the Master supplied with the winchesters at no extra cost provides an easy and efficient file management system. The entire contents of the drive are displayed on the screen on boot up, each file or directory appearing as an icon. The icon type indicates whether directory or file and type of data if latter.

Files can be loaded by pointing at the icon.

*Larger capacity drives available on request.*

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| **P30HD** 30Mb Winchester Drive | **£435(a)** |
| **P40HD TECHNOMATIC 40 Mbyte Winchester Drive with Acorn ADFS ROM** | **£669(a)** |
| **P204HP TECHNOMATIC 20 Mbyte Winchester** and a 80T DS floppy Drive built in a monitor stand. Includes ADFS Rom. | **£609(a)** |
| **P2041HT** As P204HP but also with a 10 Mbyte tape streamer backup unit and backup utilities. Includes ADFS Rom. | **£1179(a)** |
| **TS10 10** Mbyte Tape Streamer Backup unit with utilities. | **£546(a)** |
| **TFC10** 10 Mbyte Pre-formatted Cartridge for use with P2041HT and TS10. | **£21(d)** |

**WINCHESTER Drive Multiplexer**




These units let you share a Winchester drive between a number of computers. Full details on request.

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| TWM2 for two computers. | **£99 (b)** |
| TWM4 for four Computers. | **£149 (b)** |

**NEW** Following the great success enjoyed by our P20HD unit, we are pleased to announce the launch of P30HD – a 30Mbyte hard drive. This drive is also supplied with the free front end utility for the Master. **£435(a)**

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| 50 5.25″ 40 T single sided discs with sleeves in lockable box. | **£25(b)** |
| 50 5.25″ 80 T double sided discs with sleeves in lockable box. | **£32(b)** |
| 50 3.5″ 80T double sided discs with sleeves in lockable box. | **£60(b)** |

**FLOPPICLENE DRIVE HEAD CLEANING KIT**

| | |
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| **5.25″ Kit** with 20 disposable discs | **£14.00(d)** |
| **3.5″ Kit** with 20 disposable discs | **£14.75(d)** |

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| **DB340** Lockable 40 × 3.5″ | **£8.50(c)** |
| **DB550** Lockable 50 × 5.25″ | **£6.50(c)** |
| **DB570** Lockable 70 × 5.25″ | **£8.50(c)** |
| **DB5100** Lockable 100 × 5.25″ | **£10.50(c)** |

# 3M FLOPPY DISCS

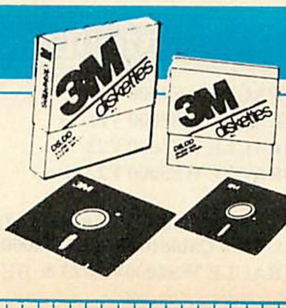
**5.25″ Discs in packs of 10**

| | |
|---|---|
| 744 40T SS DD | **£6.50(d)** |
| 745 40T DS DD | **£8.00(d)** |
| 746 80T SS DD | **£12.00(d)** |
| 747 80T DS DD | **£11.00(d)** |

**3.5″ Discs in packs of 10**

| | |
|---|---|
| 80T SS DD | **£13.50(d)** |
| 80T DS DD | **£15.00(d)** |

(Add £1 for library case packing)






All prices ex VAT and subject to change without notice. See page 5 for Carriage Charges.

# TECHNOMATIC

## 305 Edgware Road, London W2 Tel: 01-723 0233

## PRINTERS

**EPSON**

| | | | |
|---|---|---|---|
| **LX800** | £179(a) | **LQ500** | £285(a) |
| **FX800** | £309(a) | **LQ850** | £439(a) |
| **FX1000** | £419(a) | **LQ1050** | £599(a) |
| **EX800** | £429(a) | **LQ2500+** | £849(a) |
| **EX1000** | £579(c) | | |

**GQ3500 Laser Printer** £1249(a)

**Taxan KP815** £159(a) **Taxan KP915** £275(a)

**Star LC10** £175(a)
**Star LC10 Colour** £249(a)

**NATIONAL PANASONIC**
**KXP1081*** £145(a) **KXP1082*** £172(a)
***(*includes Wysiwyg ROM + Master Lead)***

**KXP3131 with 38K buffer** £245(a)
**Canon PW1080A** £149(a)
**Canon Laser LBP8-II** £1595(a)
**Brother HR20 Daisy Wheel** £349(a)
**Juki 6100 Daisy Wheel** £295(a)
**Integrex Colour Inkjet** £529(a)

## PLOTTERS

**Hitachi 672XD** A3 4 Colour HPGL £499(a)
**Plotmate A4S** £379(a)
**Plotmate A3M** £549(a)
**Roland 880** A3 Flat bed 8 col £599(a)
Variety of Plotter pens and accessories in stock.
*Larger Plotters available. Please enquire.*

## EPSON LQ500

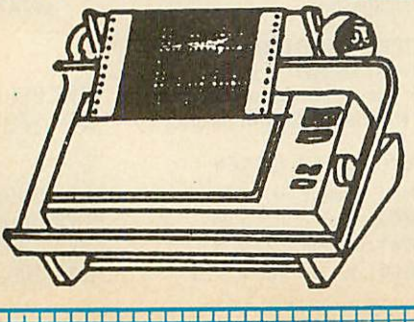
Epson's budget 24pin letter quality printer provides unrivalled print quality with two built in letter quality fonts and widest repertoire of type styles at low cost. Sans Serif and Roman or draft font can be selected from the front panel. Maximum resolution of 360 × 180 dpi. Friction and tractor as standard. Parallel interface. Designed for low noise operation 55dB(A).
Introductory price incl. master lead **£279(a)**

## EPSON LX800

Epson's latest budget printer offers a host of new features all utilising Epson's unrivalled knowhow of printer technology and reliability.
★ 180cps draft/25cps NLQ ★ two modern fonts as std: Sans Serif and ROMAN. NLQ font selection from front panel ★ Tractor and friction feed ★ Single sheet guide with auto load switch. Original + 2 copies.
★ 3K input buffer with character downloading facility
★ Fully compatible with BBC & IBM graphics
★ Centronics interface as standard
★ Price including BBC master lead **£179(a)**

## PRINTER STAND

A new style printer stand with easy paper feed and paper seperation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. **£26 (b)**



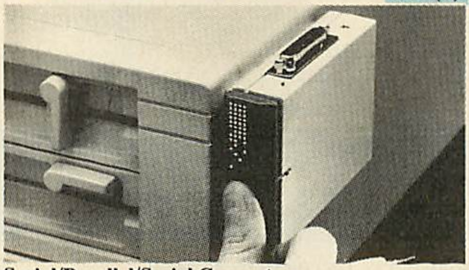
## PRINTER BUFFERS SHARER & CONVERTERS

**TSB 256 Auto Sharer/Buffer**
256K buffer with 3 input ports. Each port scanned automatically every 10 secs until data found. PAUSE, COPY and RESET Facitilies. Full spec on request. **£169(a)**

**Smart Printer Buffers**
Facilities include: COPY upto 265 copies PAUSE, RESET, Self-Test.
For serial: X-on/X-off, ETX/ACK or DTR/DTS protocols independently selectable baud rate for each port
PP256 256K Parallel buffer **£169(b)**
SS256 256K Serial buffer **£189(b)**

**Parallel Multi-Spoolers**
Allows connecting 2 printers to 2 or 4 computers
Butter allows quick dumping of data to free the computers
COPY allows upto 999 copies, SELF-TEST, PAUSE, CLEAR
MS422 4computers/2printers 512K buffer **£299(b)**
MS223 2computers/2 printers 512K butter **£199(b)**

**Compact Two Way Switch** 2 computers to 1 printer or 2 printers to 1 computer Attaches to the side of a computer or a printer **£23(c)**



**Serial/Parallel/Serial Converters**
Compact economical converters which support X-on/X-off, ETX/ACK, DTR/DSR protocols
C-PS Parallel/Serial converter **£35(c)**
C-SP Serial Parallel converter **£35(c)**
*Add £49 to above prices for units with 64K butter*

**Manual Printer Sharers:**

| (All lines are switched). | Parallel | Serial |
|---|---|---|
| 2 computers to one printer | £25(c) | £25(c) |
| 3 computers to one printer | £39(c) | £39(c) |
| 4 computers to one printer | £45(c) | £45(c) |
| 2 computers to 1 or 2 printers | £49(c) | £49(c) |

*Cable sets for above sharers available for all popular computers*

**BBC Computer Sharer: TCS26**
1 computer to 2 printers fitted with BBC cable **£21(c)**

**Paper & Labels**
Plain fanfold paper with microperforation:
2000 sheets 9½ × 11″ **£12(£3.50)**
2000 sheets 14½ × 11″ **£18.50(£4.50)**
1500 sheets A4 90gsm **£18.00(£4.00)**

**Labels/1000**
Single Row 3½″ × 1⁷⁄₁₆″ (d) Triple Row 2⁷⁄₁₆″ × ⁷⁄₁₆″ **£5(d)**
OHP Transparencies A4 (100) **£56(b)**

**PARALLEL PRINTER LEADS**
BBC/Master (1.2m) **£5(d)** BBC/Master (2m) **£7(d)**
Archimedes (2m) **£7(d)** Compact (1.2m) **£7(fd)**

## MODEMS

**MIRACLE WS4000 V21/23** £129(b)
**MIRACLE WS3000 V21/23** £244(b)
**MIRACLE WS3000 V22** £379(b)
**MIRACLE WS3000 V22 bis** £495(b)
**Pace Linnet** £139(b)
**(All modems are BABT approved)**
**BBC Data Cable for WS3000/4000** £10(d)
**MIRACLE WS2000 V21/23** & BELL stds £92(c)

## MONITORS

### 12″, 14″ and 20″ MONITORS

**Microvitec 1431**
Std Res, 14″ **£179(a)**
**Microvitec 1431AP**
Std Res + PAL/Aud, 14″ **£199(a)**
**Microvitec 1451**
Med Res, 14″ **£225(a)**
**Microvitec 1451AP**
Med Res + PAL/Aud, 14″ **£255(a)**
**Microvitec 1441**
Hi Res, 14″ **£359(a)**

**Philips 8833 14″ RGB**
Med Res, 14″, high contract screen, TTL/Linear input, Mono/Colour Switch Stereo Sound Input. Separate controls for brilliance and contrast. **£219(a)**

**Sanyo CRT 70**
14″ High Resolution Colour Monitor **£149(a)**
*Compatible with Master, B, Compact, and PC compatibles*

**Microvitec 2030CS**
20″ Standard Resolution RGB/Comp Video **£380(a)**

**Microvitec 2040CS**
20″ High Resolution RGB/Comp Video **£675(a)**

**TAXAN SUPER VISION 620**
12″ Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible **£269(a)**

**TAXAN SUPER VISION 625**
12″ Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible. **£319(a)**

**TAXAN 770+**
MultiSysnc Autoscan 14″, ideal for utilising the hi res modes on Archimedes. Our price includes a tilt & swivel stand **£485(a)**

**NEC MultiSync II 14″**
Enhanced version of the original NEC MultiSync. complete with tilt & swivel base. Suitable for Archimedes and PC compatibles. **£479(a)**

### MONOCHROME MONITORS

**PHILIPS 7752** NEW
14″ green screen monitor.
This is a new addition to the Philips' popular mono monitors. Features include Flat screen, Inverse video switch, separate brilliance and contrast controls. **£85(a)**

**PHILIPS BM 7502**
Hi Res green screen **£72(a)**
**PHILIPS BM 7522**
Hi Res amber screen **£79(a)**
Tilt & Swivel Stand for Philips Mono **£6(c)**

### MONITOR ACCESSORIES

Microvitec Swivel Base (14″ plastic monitors) **£17(c)**
Monitor Stand Models B & B+ **£10(c)**
Monitor Stand Master **£13(c)**
Double Tier Stand Models B, B+ or Master **£24(b)**
Taxan RGB Lead **£7(d)**
Microvitec Lead **£4(d)**
Monochrome BNC/Phono Lead **£4(d)**
Copy Holder Self Supporting A4 **£15(c)**

# TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

## CAD/DRAWING PACKAGES

**NOVACAD**
Cad Package for B, B & MASTER.
(See page 5 for specification)

| | |
|---|---|
| Tracker Ball/Mouse Version (TM) | £49 (d) |
| TM Version plus Tracker Ball | £94 (d) |
| TM Version plus Mouse | £79 (d) |
| Plotter Driver Generator | £15 (d) |
| *If purchased with Novacad* | £12 (d) |

**MOUSE**

| | |
|---|---|
| AMX MOUSE with SUPER ART (pse specify B, B+ or Master) | £59 (d) |
| STOP PRESS (Pagemaker) | £32 (d) |
| EXTRA/EXTRA (utility for the Pagemaker) | £19(d) |
| MAX | £17 (d) |
| STAND ALONE MOUSE | £34 (c) |

**RB2 TRACKER BALL**

| | |
|---|---|
| RB2 Tracker Ball with Icon Master (for B, B+ & Master) | £59 (c) |
| RB2 Tracker Ball with Cursor Control Rom (for Master only) | £59 (c) |
| RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software) | £47 (c) |
| Cursor Control Rom for Master | £12.50 (d) |
| MIRRORSOFT FLEET STREET EDITOR | £35 (d) |

## TIME WARP

Real Time Clock, Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program £29(d)

## BBC SOFT/FIRMWARE

### DATABASE MANAGEMENT SYSTEMS

| | |
|---|---|
| VIEWSTORE | £36 (d) |
| STARdataBASE | £39 (d) |
| MASTERFILE II | £17 (d) |
| ACORN OVERVIEW PACKAGE Special Offer (RRP £86) | £69 (b) |
| INTERBASE | £49 (d) |

### WORD PROCESSORS

| | |
|---|---|
| ACORN VIEW PROFESSIONAL (BBC) | £69 (c) |
| VIEW 2.1 | £35 (d) |
| VIEW 3.0 | £45 (c) |
| Double View Rom Version | £42 (d) |
| Double View Disc Version (for Master & Compact) | £33 (d) |
| VIEW INDEX | £12 (d) |
| VIEW PRINTER DRIVER GENERATOR | £8 (d) |
| VIEWSPELL | £29 (d) |
| DOT PRINT PLUS | £28 (d) |
| WORDWISE | £24 (d) |
| WORDWISE PLUS | £38 (d) |
| WYSIWYG PLUS | £21 (d) |
| SPELLMASTER | £42 (d) |
| INTERWORD | £36 (d) |
| WORDEASE | £24 (d) |
| SPELLCHECK III | £31 (d) |
| EDWORD II | £43 (c) |

### SPREADSHEETS

| | |
|---|---|
| VIEWSHEET | £36 (d) |
| WINDOMATIC (A Viewsheet Utility) | £15 (d) |
| VIEWPLOT | £22 (d) |
| INTERSHEET | £37 (d) |
| INTERCHART | £25 (d) |
| ULTRACALC | £26 (d) |
| **MINI OFFICE II DISC Version** | |
| For B & B+ 40T or 80T | £14 (d) |
| For Master 80T | £16 (d) |
| For Compact | £19 (d) |
| **MINI OFFICE II ROM Version** | |
| For Master, Compact, B+ & B | £43 (c) |
| MEGA 3Rom | £76 (b) |

CC's integrated package offering Interword, Intersheet & Interchart on one 128K ROM. For Master, Compact, B+ & B

### LANGUAGES

| | |
|---|---|
| META ASSEMBLER | £145 (b) |
| TEAM DISASSEMBLER | £145 (b) |
| MACROM | £33 (d) |
| ACORNSOFT 'C' | £40 (c) |
| ACORN MICRO PROLOG | £62 (d) |
| ISO-PASCAL | £51 (c) |
| ISO-PASCAL STAND ALONE GENERATOR | £30 (d) |
| OXFORD PASCAL (40 or 80T) Specify B or B+ | £36 (d) |
| OXFORD PASCAL for Master | £52 (d) |
| ACORN LOGO | £46 (c) |
| LOGOTRON LOGO | £55 (c) |
| BBC PUBLICATIONS OPEN LOGO | £59 (c) |
| ACORN LISP ROM | £39 (d) |
| ACORN FORTH ROM | £39 (d) |
| ACORN COMAL ROM | £39 (d) |
| Advanced BASIC Disc (for B, B+ & Master + 6502 2nd Processor) | £26 (d) |
| MICROTEXT | £52 (c) |
| MICROTEXT PLUS | £229 (b) |

### COMMUNICATIONS

| | |
|---|---|
| TERMULATOR | £25 (d) |
| COMMSTAR II | £28 (d) |
| MAYA Comms Package See next page for details NEW | £49 (d) |
| MODEM MASTER | £11 (d) |
| COMMAND | £34 (d) |
| MASTER TERMULATOR | £34.75 (d) |

### UTILITIES

| | |
|---|---|
| ACORN ADFS ROM | £26 (d) |
| ACORN BASIC EDITOR | £24 (d) |
| MONITOR (BBC Pub) | £19 (d) |
| SLEUTH | £23 (d) |
| TOOLKIT PLUS | £31 (d) |
| TOOLBOX 2 (BBC Pub) Manual | £9.50 (d) |
| Cassette | £9 (d) |
| ACORN GXR GRAPHICS ROM specify B or B+ | £24(d) |
| PRINTMASTER | £24 (d) |
| PRINTWISE | £24 (d) |
| DUMPMASTER | £26 (d) |
| FONTWISE PLUS | £17 (d) |
| ADV TELETEXT UTILITIES ROM | £7.95 (d) |

### COMPACT (all on 3½" disc)

| | |
|---|---|
| ARTROOM | £27 (d) |
| FONTWISE+ | £22 (d) |
| FONT EDITOR | £22 (d) |
| BETABASE | £27 (d) |
| WHITE KNIGHT MKII | £16 (d) |

## BBC PUBLICATIONS EDUCATIONAL SOFTWARE

A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.

### PRIMARY EDUCATION

| | |
|---|---|
| ASTRONOMY | £11 (d) |
| COMPUTERS AT WORK | Aud/EC/disc£16 (c) |
| PICTURE CRAFT | Disc£17 (d) |
| INTRODUCING GEOGRAPHY | Disc£16 (d) |
| MATHS WITH A STORY 1 | Cass£8 (d) |
| MATHS WITH A STORY 2 | Cass£8 (d) |
| NUMBER GAMES | Cass/EC£7.50 (d) |
| USING YOUR COMPUTER | Cass£24 (c) |
| THE HALL OF MIRRORS | Disc£13 (d) |
| MATHS | Disc+AudCas£17(d) |

### SECONDARY LEARNING

| | |
|---|---|
| TECHNOLOGY & DESIGN Pt1 | £21.50 (c) |
| ELECTRIC FIELDS | £10.50 (d) |
| ADVANCED LEVEL STUDIES: STATISTICS | Disc£23 (d) |
| ADVANCED STUDIES: GEOGRAPHY | Disc£17 (d) |
| INSIDE INFORMATION | Prog Cass£10 (d) |
| Book£8(d) | Audio Cass£5 (d) |
| OPEN LEARNING PACK | Disc/AudCas+book£36(b) |
| **SCIENCE TOPICS (ST)** | |
| S.T.:WAVES | Disc£14 (d) |
| S.T.:RELATIONSHIPS | Disc£14 (d) |
| S.T.:BONDING | Disc£14 (d) |
| S.T.:ELECTROMAGNETIC SPECTRUM | |
| S.T.:ELECTRONICS IN ACTION | Disc£14 |
| S.T.:NEWTON & THE SHUTTLE | Disc£19 |
| S.T.:ECOLOGY | Disc/EC£19 |
| S.T.:POLYMERS | Disc/EC£19 (d) |
| S.T.:CLASSIFICATION & PERIODIC TABLE | Disc£20 (d) |
| S.T.:FOOD & POPULATION | Disc£20 (d) |
| SEC.SCIENCE MICROTECHNOLOGY | Cass£7 (d) |
| SEC.SCIENCE:THE MOLE CONCEPT | Disc/Aud/EC£16 (c) |
| BIRD SPY | Disc£13 (d) |
| GEORDIE Racer | Disc£13 (d) |

### GENERAL

| | |
|---|---|
| VU-TYPE PROFESSIONAL | Disc£19 (d) |
| WHITE KNIGHT MK II (for 1770 DFS) | Disc£16 (d) |
| BATTLEFIELDS | Cass£8.50 (d) |
| A VOUS LA FRANCE | Disc£20 (d) |
| Book£5.25 (d) | Aud Cass(2)£7 (d) |
| ESPANA VIVA | Disc£19 (d) |
| Audio Cass(2)£8 (d) | Book£6.95 (d) |
| | (2) £7.50 (a) |
| DEUTSCH DIREKT | Disc/aud/EC£16 (c) |
| | Book£5.95 (d) |

**BLACK QUEEN**
A long awaited bridge game. (1770DFS) £13(d)

**BISMARCK**
History of the famous battleship. (1770DFS) £13(d)

All software in this advertisement has been tested to work with appropriate Acorn Disc Filing Systems only and we are unable to comment on compatibility with any other filing system. It will be the buyers responsibility to verify such compatibility.



All prices ex VAT and subject to change without notice. See page 5 for Carriage Charges.

# TECHNOMATIC

**305 Edgware Road, London W2 Tel: 01-723 0233**

## BOOKS

**No VAT Carriage Code (c)**

| LANGUAGES | |
|---|---|
| 6502 Assy Lang Prog | £19.95 |
| 6502 Programming | £13.95 |
| 8086 Book | £23.95 |
| Acorn BCPI User Guide | £15.00 |
| Acorn FORTH | £7.50 |
| Acorn LISP | £7.50 |
| Acorn ISO Pascal Ref Manual | £10.00 |
| Intro to COMAL | £10.00 |
| Intro to LOGO | £7.50 |
| Micro Prolog Ref Manual | £10.00 |
| Introduction to Turbo Pascal | £14.95 |
| Prog the Micro with Pascal | £8.50 |
| The Supervisor's BBC Micro | £10.95 |

| BBC MICRO GUIDE BOOKS | |
|---|---|
| Inside Information | £8.95 |
| Maths Prog in BBC Basic | £7.95 |
| The Friendly Computer Book | £4.50 |
| Toolbox 2 | £10.95 |

| ARCHIMEDES | |
|---|---|
| Archimedes Reference Manual | £29.95(b) |
| ARM Assembly Language Prog | £12.95(b) |
| Inside Autosketch | £15(b) |

| PROGRAMMING/UTILITY | |
|---|---|
| Advanced Sideways Ram User Guide | £9.95 |
| Advanced User Guide (BBC) | £15.95 |
| Applied Assembly Language on the BBC | £9.95 |
| BBC Micro Advance Programming | £9.95 |
| BBC Micro Ref Guide (B Smith) | £10.95 |
| BBC Micro Sideways ROM's RAM's | £9.95 |
| Guide to the BBC Rom | £9.95 |
| Beginners Guide to W.P. | £7.95 |
| Mastering Assembly Code | £8.95 |
| **Mastering Interpreters & Compilers** | £14.95 |
| **Master Operating System** | £6.95 |
| **Mastering View, Viewsheet & Viewstore** | £12.95 |
| **View by B. Smith** | £12.95 |
| View 3.0 User Guide | £9.00 |
| Viewstore User Guide | £9.00 |
| Viewsheet User Guide | £9.00 |
| Wordwise Plus | £9.95 |

| SOUND & GRAPHICS | |
|---|---|
| Computer Graphics & CAD Fundementals | £9.95 |
| Mastering Music | £6.95 |

| DISC DRIVE SYSTEMS | |
|---|---|
| Advanced Disc User Guide | £16.95 |
| Disc Book | £3.50 |
| Disc Programming Techniques | £7.95 |
| Disc Systems | £6.95 |
| File Handling on the BBC | £6.95 |
| Discovering Disc Drives | £POA |
| Practical Disc File Techniques | £5.95 |
| Mastering the Disc Drive | £12.95 |
| Mastering DOS plus | £12.95 |

| APPLICATIONS | |
|---|---|
| Interfacing Proj for BBC | £6.95 |
| BBC and Small Business | £5.75 |
| The Software Business | £5.50 |

**Mastering Operating System (David Atherton) ............... £6.95**

## WYSIWYG PLUS

**WYSIWYG PLUS** is a printer and screen utility for Wordwise Plus, View, Interword, and Basic users, supplied on a 16K Eprom. To obtain a particular printer effect, such as enlarged text, it used to be necessary to discover the appropriate 'printer control code' from your manual and incorporate it into your text. Secondly, you had to print several trial copies in order to position the effect correctly in relation to the rest of your text.

**WYSIWYG PLUS** simplifies this trial and error approach using easily remembered *commands. For example, *ENLARGED not only selects enlarged text on your printer, but uniquely shows you double width characters on your screen, even from within Wordwise Plus!

**WYSIWYG PLUS** incorporates a logo editor. Just draw your design on screen using the arrow keys, and save the results. Use the *GRAPHICS command to incorporate your design anywhere in your text; position and see your design in your text before faithfully reproducing a hard copy.

There is also special help for daisy wheel users. The *WHEEL command will prompt you to change daisy wheels whenever a change in type style is about to occur.

**WYSIWYG PLUS** is designed to work with the following systems:

| | | |
|---|---|---|
| BBC Model B | 6502 Second Processor, | BBC Master 128 |
| BBC Model B+ | Turbo coprocessor | All printers (Except lasers) |

**WYSIWYG PLUS** workspace is relocatable. **£21(d)**

## MAYA TERMINAL EMULATOR

A comms package for the professional user. MAYA emulates DEC VT52, VT100 and Tandberg TDV2215. Special BBC VDU mode allows full access to the BBC VDU driver.

Menu driven software allows the setting up of parameters and function key definitions which can be saved to disc for future use.

Flexible command parser provides a uniform user interface and allows full access to * commands and HELP facilities.

Xmodem and Kermit file transfer protocols are included as standard. Unique feature of MAYA is that Kermit can also be used in 'remote mode', which allows file transfers to be initiated by other computers connected to the BBC. File transfers can also be done with a 'dumb' ASCII protocol. Open architecture allows for expansion and addition of new features. Options currently under development are graphics drivers for Tektronix 4010/4014 emulation, TDGR driver for TDV2215 and a Viewdata patch (provisional version included in the current issue). Registered users will be provided with regular updates and customisation service will also be available to those interested.

The package comprises of a rom, utils disc and a comprehensive manual. It is compatible with Master, Models B & B+. It supports DFS, ADFS, NFS and ANFS filing systems. **£49(d)**

## BLACK QUEEN

A contract bridge program from BBC Publications both for beginners and for club players. Features include rebid and/or reply of any deal just played. Deals can be saved to a disc. Unique feature of Black Queen is its ability to construct deals from standard or classic ones in newspapers etc.

Compatible with Master, B and B+ **£13(d)**

## EDUCATIONAL/FUN SOFTWARE BUNDLE

Wordmover, Drawstick, Wordplay, Pantry Antics, Locomotion

These programs are supplied from the BBC Publications Educational Software range and will be supplied on a 5.25" disc for BBC Master, B+ and B and on a 3.5" disc for the Compact.

**5.25" Disc £17.50(d)**
**3.5" Disc £18.50(d)**
**(Normal RRP over £40)**

***See the previous page for comments on compatibility.***

## VU-TYPE

Do you have finger trouble when typing?
Do your letters look like this?

Dear Sor,
I wuold like to...

then you need:

**VU-type,** a complete touch typing program produced by BBC/Pitman.

It allows you to learn at your own pace and has a wide range of exercises. Screen displays show the keys you have pressed and it will report on your speed and accuracy.

Supplied on a 40T Disc with a manual.

**Available at a special price of £7.50(d)** instead of the usual £15. Offer valid while stocks last.

## BISMARCK

An enthralling game of strategy involving the famous German battleship of the same name.

You can play the role of British Navy in its quest to find the Bismarck and sink it or take either British or German role against another player. It requires the highest qualities of judgement, observation and decision to plan strategy and tactics to plot the death of Bismarck. **£13(d)**

## PRINTER ACCESSORIES

| EPSON ACCESSORIES: | |
|---|---|
| **8143** RS232 | £32 (d) |
| **8148** + RS232 + 8k | £79 (d) |
| **IEEE 488** | £40 (d) |
| **Apple II** | £40 (d) |
| Colour option of EX800/1000 | £55 (d) |
| **TRACTOR FEEDERS** | |
| **LQ800** | £44 (b) |
| **LQ1000** | £55 (b) |
| **LQ850** | £70 (b) |
| **LQ1050** | £85 (b) |
| **LQ2500+** | £90 (b) |
| **EX800** | £85 (b) |
| **EX1000** | £90(b) |
| **SHEET FEEDERS:** | |
| **LQ800/850** | £159 (b) |
| **LQ1000/1050** | £189 (b) |
| **EX800/FX800** | £159 (b) |
| **EX1000/LQ2500+** | £225 (b) |
| **FX1000** | £189 (b) |
| Ribbons: | |
| FX/FX100/100+, FX105 | £7 (d) |
| RX/FX80, FX85/800 | £4 (d) |
| LX80/LX800 | £4.50 (d) |
| LQ800/850 | £6 (d) |
| LQ1000/1050 | £7.75 (d) |
| EX800/1000 Black | £7.50 (d) |
| EX800/1000 Colour | £16.80 (d) |
| H180 Pen Set (Aqueous/Ball point) | £8.25 (d) |
| **HITACHI 672 Plotter** | |
| Aqueous Pen Set six pens | £18.50 (d) |
| Oil Based Pen Set six pens | £25.00 (d) |
| **TAXAN CANON Accessories:** | |
| Ribbon, KP810/815/910/915 | £6 (d) |

| Star Printer | |
|---|---|
| NL10/LC10 Sheet Feeder | £55 (b) |
| NL10/LC10 Ribbon | £4.50 (b) |
| **National Panasonic KX P1080/81** | |
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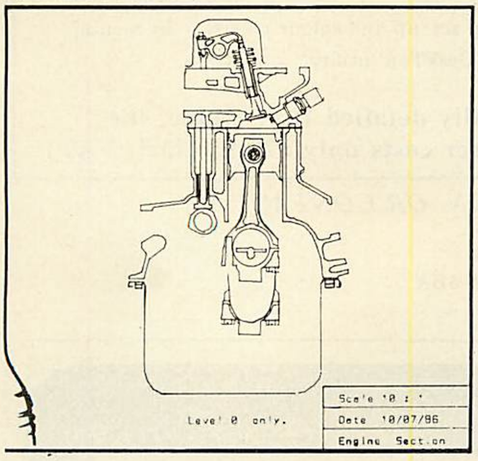
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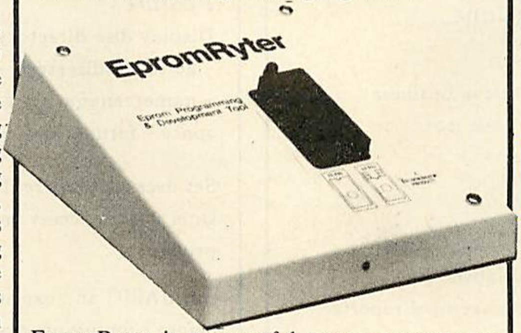
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# HINTS & TIPS

# FIND OUT ABOUT LIBRARIES

**How ADFS libraries work, capturing a real-time clock from teletext, creating double-width text and a program to represent on-screen how much memory is free are among this month's bright ideas**

***David Atherton***

## A LOOK AT LIBRARIES

This month, in my examination of ADFS, I am going to explain the sometimes confusing concept of libraries. Much of the difficulty people have with libraries arises because they come to ADFS after using the normal Disc Filing System. In DFS, libraries exist, but are much less important, because when you look at the catalogue, you can see all the files on disc at once.

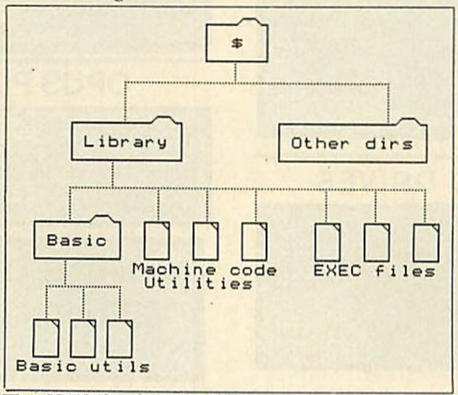
A library is an alternative directory to the current one. This means that if you try to load a file, and it isn't in your current directory, then the filing system tries to load it from the library before giving up and reporting 'Not found'. Actually the library system doesn't work with LOAD, *LOAD, CHAIN, *EXEC and so on, but only with *RUN or *<filename>. This means that library programs really need to be in machine code, or on a Master they can be *EXEC files. This is because the Master's operating system will *EXEC any file you tell it to *RUN, if the execution address is &FFFFFFFF. *BUILD sets such an address automatically.

The library should therefore be filled with machine code routines which you wish to use, but do not want to clutter up your current directory. Such routines might include many provided in this column, or other commercial and published utilities such as screen dumps, screen compressors, cross-referencers and so on. If you create a directory called 'Library' in the $directory of your disc, then you sometimes don't even need to set the library explicitly when you start, because *MOUNT and *ADFS include in their startup routines a check on whether a directory called $.Library exists. If so, they make it the current library. The first directory found that starts with 'Lib' is used, so a directory called 'Liberal' would be used instead of Library. ADFS on the Master series doesn't do this, so you'll have to type *LIB LIB* to get the same effect.

Whichever directory you are using on your ADFS disc, files in the library will always be available to *RUN. If you need Basic programs in your library, you can use one of the many published converters which make a Basic program runnable with a star command. Alternatively, if you only have a couple of Basic programs in your library, you could do what I do. First, create a subdirectory within the library called Basic, and place in it all your Basic library programs. Then create an *EXEC file for each program in the Library directory itself.

```
*BUILD $.Library.Example
0001 *BASIC
0002 CHAIN $.Library.BASIC.Example"
```

Obviously, you should substitute your own program name for Example. The figure below shows a typical directory tree to make things clearer.




**The ADFS library structure**

This technique will give you the ability to use many additional star commands, in the same way that they are provided by ROM-based utilities. The only drawback is that Basic programs and some machine code programs may use areas of memory that they shouldn't. Of course, there is another problem, which is that the library is only available while the correct disc is in your drive.

Obviously this isn't a problem for hard disc or network users, but for floppy drive owners, the majority of us, it can be tedious to copy the contents of your library onto each working disc.

Fortunately, if you have a dual disc drive, there is a way round this. The library need not be on the same disc as the directory you're working in. So, for example, you could have a large library completely filling a 640k ADFS disc in drive 1, and your work disc, with no library at all, in drive 0. If you then type:

```
*MOUNT 0
*DIR <whatever ...>
*LIBRARY :1.Library
```

the programs in the Library directory of drive 1 will be available. You can select any directory on either drive 0 or drive 1 without altering the library setting. If you wish to select a directory on drive 1, then do it with *DIR:1.<directory>, and don't use the *MOUNT command, as with some ADFS versions this resets the library setting, as mentioned above.

Note that the catalogue display, while correctly naming the library, does not identify which drive it is on. However, you can check this by typing *LCAT, the command to catalogue the current library. The library catalogue listing will show which drive it is on. *LCAT does for the current library what *CAT does for the current directory.

There is another command associated with this, *LEX, which has the same effect on the library as *EX does on the directory (similar to *INFO on DFS, but directory rather than file-based). Because there is only one library the command cannot take parameters, unlike *CAT and *EX, and any parameters that you type will therefore be ignored. It is worth mentioning that this trick of setting your library to run on a

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different drive also applies to DFS. With DFS if you have a group of utilities called, say U.DUMP, U.PACK and so on, whereas *LIB U will allow you to invoke these programs, though they will still clutter up your catalogue, as DFS always displays all the files when you type *CAT.

However, if you have a double-sided drive, you can put the utilities on the other side (Side 2), and type *DIR:0. $ and then *LIB:2. $. Then the library files will not be in the way or taking up any space in your working area on drive 0. But they'll still be available as star commands.

Dual drive users are able to perform the same trick by putting the utilities on a separate disc in drive 1 and then typing *LIB:1.$.

On the Master series, the library does not even have to be in the same filing system as the one you are currently working in. This feature is of most benefit to network users, where they can work on their own ADFS or DFS discs, but have access to the network utility library. However, there is no reason why a library may not be kept in DFS while working in ADFS. If your ADFS disc is in drive 0, and your DFS library disc is in drive 1, then typing *ADFS, then *-DISC-LIB:1.$ and *-DISC-LIBFS will leave you in ADFS with drive 0 mounted. But when a star command is used, the library on the DFS disc would be searched.

In this set up, you can have an extra ADFS library as well. The order of search for a file is first the current directory, then the library of the current filing system (if any), and then the library of the filing system selected by *LIBFS (if any). To 'undo' any secondary library, just type *LIBFS. This command effectively means 'make the current filing system the library filing system'.

To finish this series on ADFS, there are a couple of points which have confused some readers. *CREATE is used on the Master to create a 'dummy' file. The command *must* be followed by the filename, and then the length of the file you wish to create. The new file will contain random data, and should not be loaded or run until you have written your correct data into it. If the created file already exists, the contents will not be changed, but the length might be adjusted.

Because of the way *CREATE works, if you use it with DFS, you could still get a 'can't extend' error if you recreate an existing file and make it longer.

The other point is about *COMPACT, and is simply that on a Master *COMPACT 0E 72 is the preferred setting. The second parameter is the number of pages used as a buffer, and not the last page, thus &72 pages from page &0E means that you should use memory from &0E00 to &8000. This will corrupt the screen but it is harmless.

## £5

## ONE LINE FUNCTION LIST

There have been many function and procedure listing programs before, but this one from Nicholas Sayers of Canterbury is something special. It runs in one line of Basic and can therefore be set up on a function key, rather than the usual method of either appending to the Basic program or working in machine code. Type in the key definition exactly as shown (listing 1 on the yellow pages) and then load or type in the program in which you wish to list the functions and procedures. At any point, pressing f0 will run Nicholas' program, and list each line number which contains a DEFPROC or DEFFN statement, and give the name of the procedure or function.




**Use these abbreviated Basic tokens**

The program works by reading through memory, starting at PAGE where the beginning of the main Basic program is, recording each line number in variable N. It then checks for a DEF token, and prints everything from it to the next carriage return. To work properly, the function definition should be a single statement line.

The function lister stops when it reaches TOP, the end of the Basic program.

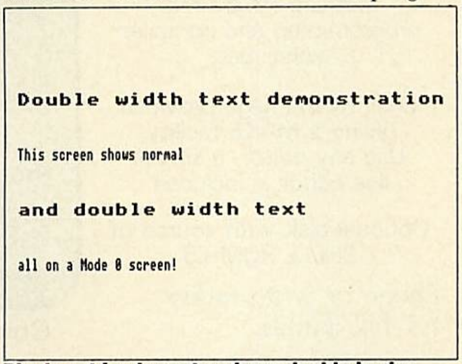
As a key definition is limited to 255 bytes, you must enter the program using the abbreviated Basic tokens shown.

If you have any other keys defined, you may get a 'Bad key' error. Just clear all the other key definitions by using *FX18.

## £5

## DOUBLE-WIDTH TEXT

J D Michael of Brighton, noticing how double-height text has been covered in this column in the past, has sent us something different – double-width text. His program (listing 2 on the yellow pages) takes a text string and prints it on screen in double width using the procedure PROCdouble. The procedure can be added to your own programs, and takes just one argument – the text to be printed, and is useful when working in mode 3, to provide easily readable mode 6 lookalike headings.




**Pixels set in character shape double in size**

The program works by reading the character data using Osword &0A, and then expanding it so that each pixel set in the character shape becomes two.

Mr Michael says that even with his limited knowledge he can see that the program could be converted to assembly language quite easily.

## £15

## MAKING A DATE

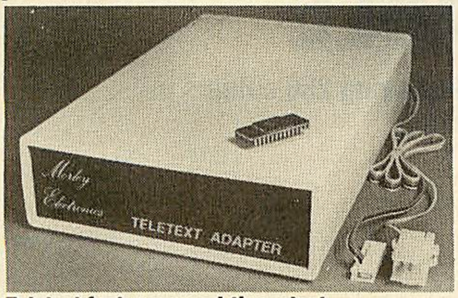
Colin Robertson, from Maidenhead, had the new GIS Teletext Adapter fitted to his BBC B and realised that one of the features of the teletext system is a real-time clock. He has sent us a useful segment program (listing 3 in the yellow pages) to allow datestamping in *Wordwise Plus*, taking the date from the Television Service Data Packet (TSDP), which is transmitted along with the teletext signal.

The program copies the date into the D$ variable, which may then be placed in your text in a number of ways, most simply by including the lines

SELECT TEXT
TYPE D$

in your segment. The date is stored in the form 'dd/mm/yy'. The program should

work on any BBC micro and with or without a 6502 second processor (and on Master series computers, although these provide a real-time clock anyway).




**Teletext features a real-time clock**

It is possible to extend the utility to provide a date in the full form '31 January 1988' or even '31st January 1988' by manipulating the data in D$. The present program is intended primarily to demonstrate a technique for reading teletext data into *Wordwise Plus*, but its procedures could be embodied in any segment program requiring a date. Once typed and saved, the utility can be loaded into any *Wordwise Plus* segment and executed with Shift plus the relevant function key.

The essential element in the program is the call to Osword with A=&7A, a series of calls in the ATS reserved for accessing teletext data. Like all Osword calls, this requires X and Y to point to a parameter block on entry. The required length of the block depends on the function. In the Osword &7A series, the first byte (offset 0) contains the command code that determines which function will be performed. To access the date, the command code is &16, and the block is 13 bytes long.

Some careful thought has been given to setting up a parameter block using the *Wordwise Plus* programming language, which does not normally support direct writing to memory. This is done by using location &430 which is where the variable L% is stored. By setting L%, location &430 is set to the required value, in this case the command code &16. A detail to note is that X% is deliberately assigned with the whole two-byte address, not just the low byte. By doing this only the low byte is written to the X register when the Osword routine is called, but the full value remains available in X% for use when reading the contents of the block afterwards. Y% is assigned with the high byte (&04) in the usual way.

The parameter block is 13 bytes long, so when the Osword call is made, the four *Wordwise Plus* integer variables L%-O% are overwritten. Each takes up four bytes. The date information is contained in 10 bytes (offsets 1-10). Offset 11 is unused. The last byte (offset 12), is an error flag, which on exit contains zero if all is well, and &FF if the date acquisition has failed.

The functional part of the program contained in the procedure PROCcalendar command at line 25 is one of several which are available for selecting one of the tuned channels in the adapter. A time delay of 1.6 seconds follows, in addition to the appreciable time it may take to acquire the channel.

The L% variable is then assigned, and the Osword procedure is called. The teletext system is then turned off. If an error in reading the date occurs, the program jumps to .error to show that no date is available. Otherwise the contents of offsets 1-10 in the parameter block are read into D$, a byte at a time. Offsets 7 and 8 are omitted, as these contain the first two digits of the year (19), and are not required for the standard date format.

Note that the numbers comprising the date are available directly as Ascii codes, and even the separator '/' is included in the parameter block where required. This greatly simplifies the acquisition program compared to the Master 128's format, given the limited facilities available in the *Wordwise Plus* programming language.

The program hasn't been tested with the popular adapter or ATS ROM, but as this call is a standard feature of ATS it should work on all ATS systems – including the original Acorn teletext adapter with BBC Soft's ATS upgrade ROM.

Colin has another tip for *Wordwise Plus* users: unlike *View*, *Wordwise Plus* doesn't have a command to differentiate between left and right-hand pages, so that the narrow margin is on the left of the paper, and the wide margin is on the right, for times when output is to be bound into a folder. However, this can be achieved very simply by taking advantage of the fact that *Wordwise Plus* always stores the page number in P%, and also that it allows the use of arithmetic when specifying numeric arguments to commands. For example, if you define your header as follows

[f1]DH[f1]LM8+P%MOD2*5[f2]

then provided that your document is set up to print a header (ie, paging is enabled and a header margin is provided), all your left-hand pages will print with an eight-character margin, and all your right-hand ones with a 13-character margin.

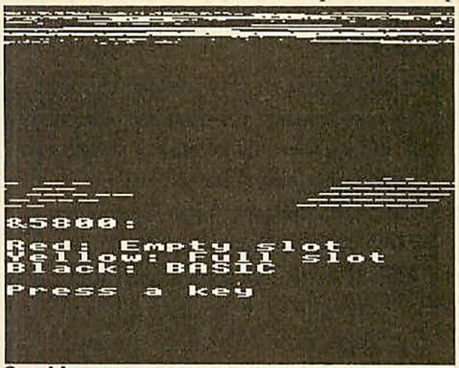
**£10**

## COLOURFUL MEMORIES

Steven Harris of Middlesbrough wanted a quick way of seeing how much memory his Basic program took up, and how much was still free, so he came up with a graphical form which quickly gives a feel for the total amount of memory used.

He has sent a short assembly language program (listing 4 on the yellow pages) which sets up a mode 5 screen, runs through memory from &0000 to &5800 and displays one pixel to represent each byte. Three colours are used in the map. These are: red for memory containing &00 which is obviously free, yellow to represent memory containing bytes other than &00, and black for the area occupied by a Basic program.

As long as you clear all memory bytes to &00 before you commence loading files, this can also be used as a quick and very useful indicator of how much memory is being used by stacks, data areas and so on. Run the program listed in the yellow pages, and then save the resulting machine code. This can then be *RUN immediately. You will be able to see the space used up




**Graphic memory map**

by both the machine code program and the original Basic source.

The program works by simply checking the contents of each byte and setting a pixel accordingly. The start and end of the current Basic program is found by reading the value of PAGE from location &18, and TOP from &12 and &13. These locations are well known to writers of Basic utilities. For speed, Steven writes the pixels directly to screen memory, rather than through the operating system, so don't have a shadow screen enabled when running this program.

*All submissions – hints, tips, programs or simply ideas – should be sent to Hints and Tips,* Acorn User, *Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ.*

# ARC AGORA

# FULLY TRANSFERABLE

**Up for discussion: transferring files from MS-DOS to the Arc, displaying 256 colours in a graduated scale and tackling the Tak function**

***Dave Acton***

£20

## EASY PC

We kick off this month with an invaluable aid for users of MS-DOS who want to transfer files to ADFS. Our utility is the handiwork of Dutch reader Jeroen Boomgaardt, and forms listing 1 on the yellow pages.

It's not a simple process to copy files from the IBM PC or other MS-DOS computers to the Arc. The problem is the same with TOS on the Atari ST, which uses an MS-DOS-like disc format. It can be done with the PC Emulator, using the GetFile utility, but if you only have a single drive you could run into difficulties. I could only manage it with the help of some Computer Concepts battery-backed RAM!

But listing 1 is an easy answer. As always, we have little space to spare on the yellow pages, and so can only publish a simple form of Jeroen's program. His full version, which also reads DFS discs, is on the November disc.

Having typed in listing 1, run the program and enter the desired source and destination drives – they can both be drive 0 if you only have a single drive. You'll be prompted to insert an MS-DOS disc into the source drive. Press a key when you've done so and the MS-DOS catalogue will be displayed.

Now enter the name of the file you want to transfer, including a file extension if necessary:



**Zenith Eazy PC**



**Archimedes 440**

MYTEXT.BAT for example. If this is a valid file and will fit in the available memory it will be loaded; if not, an appropriate error message will be displayed. The amount of buffer space is displayed when you first run the program. It can be increased by reconfiguring your machine with a smaller screen size or something similar.

You cannot load files from MS-DOS subdirectories, so make sure all files to be transferred are in the root. If the MS-DOS file is loaded correctly you will be asked to insert the destination (ADFS) disc. Do so and press a key – the file will be saved and the whole process repeated again. Press Escape to leave the program.

Listing 1 works by making use of the SWI call 'ADFS – DiscOp'. This call can be persuaded to read MS-DOS discs, although listing 1 requires an 'identity' byte to be present at the start of the disc. The first byte of the disc is checked by the UNTIL at line 880 and its value should be either &E9 or &EB for the disc to be recognised as an MS-DOS one. Whereas MS-DOS PC discs have this byte as standard, it appears Atari ST discs do not and so must be edited using an appropriate disc sector editor. We used ANTIC's *Disk Doctor* to prepare Atari discs for file transfer, but any good ST disc editor will do. Alternatively, you can remove the UNTIL at line 880 and the REPEAT a little before it. Remember to put the right disc in the drive at the right time – this is the only check on whether you've got an MS-DOS or ADFS disc in the drive.

Disc sectors are read using PROCreadsector. This takes a variety of parameters describing where on the disc to look and what sort of disc it is. The type and size of the disc is discovered by PROCdirmsdos. The nature of MS-DOS discs is too complex to discuss here, so if you are interested in exactly how the program functions you should acquire MS-DOS datasheets and refer to them while looking at listing 1. The mildly curious might like a brief description though, so here goes.

MS-DOS files are stored as 'clusters' of data.



**Atari 1040 ST**

A cluster consists of one or more disc sectors and the cluster that contains the first part of a file is recorded in the disc catalogue. However, because data can be deleted and 'holes' opened up on a disc, files may be spread across a disc in disjointed chunks. To locate the rest of a file we must consult a 'FAT' or 'File Allocation Table'. A FAT contains a series of pointers – one for each cluster. And the pointers it contains are themselves cluster numbers. So, once we have the number of a file's first cluster we simply look up the next cluster number in the FAT and so on. To make things awkward, FAT entries tend to be 12 bits long. This explains the occasional need to multiply things

by 1.5 when extracting information. FNevalfat takes a cluster number (multiplied by the magic 1.5) and returns the number of the next cluster to examine. The file is loaded – cluster by cluster – into the buffer called buf%.

The procedure PROCcluster performs the task of loading a single cluster and takes two parameters: the cluster number and the location in memory to place the data that is read.

## PALETTE FILES

This short procedure will allow you to use palette files produced with the Desktop palette editor in your own programs. It should work in any 16-colour mode.

```
1000 DEF PROCpalette (f
ile$)
 1010 LOCAL file%, col%
 1020 file%=OPENIN file$
 1030 FOR col%=0 TO 15
 1040 COLOUR col%, BGET#
 file%, BGET# file%, BGE
T# file%
 1050 NEXT
 1060 VDU 19, 0, 24, BGE
T# file%, BGET# file%, B
GET# file%
 1070 FOR col%=1 TO 3
 1080 MOUSE COLOUR BGET#
 file%, BGET# file%, BGE
T# file%
 1090 NEXT
 1100 CLOSE# file%
 1110 ENDPROC
```

**Procedure to load palette files**

It redefines all the colours, as well as the border and pointer.

## TAK TWO

Loyal readers may well remember David Johnson-Davies' article on the Tak function. It appeared in the June 1986 issue of *Acorn User*, and an update came along in November 1986. The Tak function is a useful little device for comparing the speeds of different machines and different languages. We thought it was about time to try the Arc at the Tak problem, and the result is listing 2 on the yellow pages.

The function Tak ( ) takes three parameters: x, y and z. If x is less than or equal to y, the value of the function is z. If x is greater than y, the value of the function is defined to be:

Tak (Tak (x-1,y,z), Tak (y-1,z,x),
Tak (z-1,x,y))

As you can see, it is very recursive.

The original article tested different languages by calculating the value of Tak (18,12,6) which is, incidentally, seven. BBC Basic managed the task in 185 seconds while the machine code version managed it in 2.64.

Listing 2 on the yellow pages finds the same answer in three different ways: using a standard Basic function, using a simple ARM machine code routine and using an ARM routine that stores values in a table for future reference. Table 1 shows the various timings and the performance of the Archimedes is as impressive as you might expect.

The Basic function is called FNt and the shortness of the name improves the speed. The first machine code routine is called by FNmc and the integer variables B%, C% and D% are used to pass the values of x, y and z to '.tak' which does the work.

If you're familiar with ARM assembly language you should be able to see how it works. The useful multiple store and load commands STM and LDM come in very handy when writing 'recursive' programs such as '.tak'. They can be used to preserve variables in exactly the same way as the Basic command LOCAL does. '.tak' begins by preserving the values of x, y and z, together with the link register. If x is not greater than y, the value of z is returned immediately. The register (r) is used to pass results back through the 'recursive tree'. Thus:

```
CMP        x,y
MOVLE      r,z
LDMLEFD    (sp)!,(x,y,z,pc)
```

is just about directly equivalent to the part of the Basic function FNt that says:

```
IF x<=y THEN =z
```

The rest of the routine merely shuffles the contents of registers about in order to make the three subsidiary calls to '.tak'. Intermediate values are preserved on the stack where necessary. The second machine code routine, '.tabtak', is a simple extension of the first. The only addition is that the table at '.table%' is examined to see if the value being calculated at present has already been worked out. If so, the value previously found is returned – removing the need for further calculation. If the value has not already been worked out it is calculated in the usual way and then stored in the table for future reference. The appropriate position in the table is found with the help of an MLA and an MUL instruction. The ARM multiply instructions are slower than other instructions (they take 16 clock cycles), but are nonetheless great time (as well as space) saving devices. They are particularly useful when addressing large tables, as is the case with '.tabtak'.

Using a table in this way dramatically improves the performance of the function. The table needs to be cleared to −1 beforehand (the value that indicates no previous calculation has been made). We've cheated a little by doing this before starting the stopwatch, but rest assured – to clear the table in machine-code takes a neglible amount of time and wouldn't affect the overall result.

| Language/Method | Machine | Time (seconds) |
|---|---|---|
| BBC Basic 2 FN | BBC Model B | 185.00 |
| 6502 machine code | BBC Model B | 2.64 |
| BBC Basic 5 FN | Archimedes | 21.93 |
| ARM machine code | Archimedes | 0.15 |
| ARM code + table | Archimedes | 0.00 (!) |

**Table 1. How long it took the Arc and BBC micro to calculate Tak (18,12,6) by various methods**

## BARS OF GOLD

We finish off this month's selection with a little something in mode 15 from Dave Lawence. Although it's nice to have 256 colours to play with, the odd way in which the colours are arranged makes it difficult to select the right hues – particularly when trying to create a nice graduated 'colour scale'.

Dave's program – listing 3 on the yellow pages – groups the 256-colour mode colours together to form scaled bars. In total, 38 such scales may be obtained and listing 3 displays them all.

Each scale consists of 12 colours and is built up from data stored at the end of listing 3. A symbol ('*', '0', '1' or '#') is read for each of the red, green and blue components of the colour. This symbol is decoded by PROCst to provide 'start' and 'increment' values and these are used to build up the scale.

Using these colour scales for sprites and other graphic effects can add considerable 'depth' to a screen.

*Send your programs, hints and tips for the Archimedes to: Arc Agora,* Acorn User, *Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ.*

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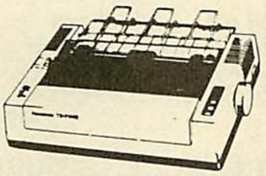
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**Acorn Dept.**
**128 West Street,**
**Portchester,**
**Hants.**
**PO16 9XE.**
**Tel: 0705 325354**

## BBC MASTER

| | |
|---|---|
| Master 128 | 359.00 |
| Master Turbo upgrade | 99.00 |
| Master 512 upgrade | 199.00 |
| Master Econet Module | 37.60 |

## BBC MASTER COMPACT (3½" DRIVE)

| | |
|---|---|
| Master Compact Entry System | 299.00 |
| Master Compact Mono System | 349.00 |
| Master Compact Colour System | 499.00 |
| RS232 Upgrade Kit | 27.50 |
| 3½ to 5½ Ext Drive Lead | 12.50 |
| Compact Printer Lead | 10.00 |

## DISC DRIVES

| | |
|---|---|
| 5¼" Akhter 2 Year Warranty | |
| MD400A D/S 40/80 no PSU | 99.00 |
| MD400B D/S 40/80 with PSU | 115.00 |
| MD802C Dual D/S 40/80 no PSU | 199.00 |
| MD802DM Dual D/S 40/80 with PSU in Plinth | 249.00 |
| 3½" Akhter 2 Year Warranty | |
| MD400F Single 400K no PSU | 98.00 |
| MD400G Single 400K with PSU | 108.00 |
| 5¼" NEC 1 Year Warranty | |
| DN400A D/S 40/80 no PSU | 99.00 |
| DN400B D/S 40/80 no PSU | 116.00 |
| DN802C Dual D/S 40/80 no PSU | 199.00 |
| DN802E Dual D/S 40/80 no PSU | 249.00 |

## MONITORS

| | |
|---|---|
| 1431 Microvitec Std Res Colour | 169.00 |
| 1451 Microvitec Med Res Colour | 209.00 |
| 7502 Phillips High Res Green | 69.00 |
| 7522 Phillips High Res Amber | 74.00 |

## PRINTERS (incl. Master/Compact Lead)

| | |
|---|---|
| Matrix | |
| Citizen 120D 120cps 25NLQ 80Col | 129.00 |
| Star LC10 100cps 25NLQ 80Col | 209.00 |
| Epson LC800 inc Tractor Unit | 209.00 |
| Star LC2410 24pin 80Col | 359.00 |
| Star NX 15 20cps 30NLQ 136Col | 329.00 |
| Epson FX1000 inc Tractor 136Col | 455.00 |
| Daisywheel | |
| Panasonic Kx P3131 17cps | 299.00 |
| Brother HR20 22cps | 439.00 |
| Laser | |
| Citizen C110 Overture | 1799.00 |
| HP Laserjet RS232 | 2664.00 |

**ALL PRICES EXCLUDING VAT**

BEFORE YOU PLACE YOUR NEXT ORDER, TALK TO US!

**Carriage outside Rotherham £6.00**

***Rotherham Computer Centre***

135 Wellgate Rotherham S60 2NN
Tel: 0709 369912

# Watford Electronics

Jessa House, 250 Lower High Street, Watford WD1 2AN, England
Tel: Watford (0923) 37774 Tlx: 8956095 Fax: 01 950 8989
Shop Hours: 9am to 6pm (Mon.-Sat.) Thursdays 9am to 8pm
All prices exclusive of VAT; subject to change without notice & available on request.
Credit Card Orders (ACCESS & VISA) Tel (0923) 33383 or 50234 (24 Hours)

Acorn The choice of Experience

The choice before and after the experience

## Archimedes micro

| System | Basic | Mono | Colour |
|---|---|---|---|
| 305 | £699 | £759 | £909 |
| 310 | £829 | £875 | £1025 |
| 310M | £879 | £925 | £1099 |
| 440 | £2399 | £2449 | £2595 |

(Securicor carr. £10 on Micros)

### Archimedes FREE PRINTER OFFER

**FREE, £160 worth of Hardware**
With every Archimedes Micro purchased from us this month, we are giving away absolutely FREE a Panasonic KX-P1081 Dot Matrix PRINTER and an Archimedes PRINTER LEAD worth £160. If you already own a printer, then simply phone in for alternatives. (P.S. This offer does not apply with 0% finance scheme mentioned in column).

- 0.5 Mb RAM for 305 — £149
- Podule Backplane — £37
- ROM Podule (Computer Concepts) — £48
- ROM Podule (C C) with Battery Backup — £59
- ROM Podule (takes five 8 bit ROMs, of 16, 32, 64 or 128K) — £56
- Archimedes Ref Manual — £29
- 2nd 800K floppy disc drive (for 305, 310 & 410) — £118
- Econet Network Board — £40
- Backplane for 2 podules, with fan (305, 310) — £39
- I/O Podule (with User port, Analogue port & 1MHz bus) — £85
- MIDI add-on to I/O Podule — £38
- MIDI Expansion Card — £66
- Real time Video Digitiser (Watford) — £249
- Sound Sampler (Armadillo) — £105
- 20 Mb Hard Disc & Controller Card — £469

#### WORDPROCESSORS

Wordwise + £18 · Pipedream £89
Image Writer £25 · View £49
Interword ROM £35 · Viewspell £32
1st Word Plus £79 · ViewIndex £12
Archie Spell Master £49

#### DATABASES

AlphaBase £39 · Viewstore £49
System's Delta Plus £60

#### SPREADSHEETS

Intersheet ROM £35 · Viewsheet £49

#### BUSINESS GRAPHICS

GammaPlot £30 · Interchart ROM £22

#### INTEGRATED PACKAGES

**Logistix** – Database, Spreadsheet, Time Management & Business Graphics £95

#### PC EMULATION Pack

(for 310, 410 & 440), including MSDOS 3.21 £79

#### GRAPHICS, ART & DESIGN

Interchart £25 · Gamma Plot £30
Artisan £31 · Gamma Plus £60
Support Disc £17 · **Autosketch** £69
Toolkit (Beebug) £32 · Toolkit (Clares) £31
Arc Termulator £59 · Zarch £16

#### LANGUAGES

ANSI 'C'; ISO-PASCAL; FORTRAN 77; £95 each
Cambridge LISP; PROLOG X £181 each
Archimedes Assembler £189
TWIN EDITOR £27

### 0% (APR) FINANCE

*For a limited period, Watford Electronics are able to offer the Archimedes range of microcomputers at **0% (APR)** finance. Credit facility available subject to status. Please inquire for further details. (Watford Electronics are Licenced Credit Brokers)*

### Archimedes to BBC SERIAL LINK

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers. Using this package it is possible to transfer any data from the BBC to Archimedes at upto 19200 baud.
By far the easiest way to transfer data to your new computer.

**Only £25**

### Archimedes 5¼"/3½" Disc drive Interface

With this interface it is possible to connect almost any 5¼"/3½" disc drive with its own power supply to the Archimedes. NO SOLDERING is involved. Supplied complete with necessary lead.

**Only £19**

Note: This is not simply a lead. Attempting to connect an external disc drive by direct connection may result in damage to your Micro.

New

**By Popular demand we are now supplying refurbished and fully guaranteed BBC Micro Model B with Disc Filing System**

(Please telephone for price & availability)

NEW

**Archimedes On-site Maintenance now available**

(Please write in for further details)

### The 80186 Co-Processor

This package consists of the Master 512 board, Watford Co-Pro Adaptor, 1770 Disc Upgrade and Acorn ADFS. This is a complete package, with its own power supply, ready to interface with your BBC Micro. The Master 512 board using the 80186 16 bit Processor at 10MHz and running Digital Research DOS Plus, gives a high degree of IBM compatibility at an extremely reasonable price. Included in the 512k package is a mouse and the amazing Digital Research GEM suite of software; GEM Paint, GEM draw and GEM desktop giving a complete Mouse Icons environment (All other GEM packages will work on the 512k). Famous packages that will work with the 512k board include Wordstar, Dbase II, Lotus 123 and many others. The only requirement to upgrade any BBC Model B to this system is you must have twin 80 track disc drives.

New low price £175

CREDIT TERMS now available. Please telephone or write in for further information.

## BBC MASTER

**MASTER** 128K Micro incl. Acorn's: View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus £125 worth of FREE OFFER (see below) **£379**

### SPECIAL OFFER

**FREE . . . £105 worth of Hardware & Software**

*Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control and **Watford's** 3½", double sided 1 Megabyte (unformated) single disc drive complete with cables, ready to connect to the micro – with every BBC Master purchased from us this month.*

***BBC MASTER with Turbo Board + above SPECIAL OFFER £513***

*512K Processor Add on Board "inc. Mouse and GEM package" £75*

***BBC MASTER plus 512K 80186 Co-processor Board (incl. Mouse and GEM package) plus the above £105 worth of SPECIAL OFFER £449***

### ADD-ONs & ACCESSORIES

| | |
|---|---|
| Turbo 65C102 Add-on Module | £116 |
| Econet Module for the Master | £40 |
| Twin ROM Cartridge for Master | £7.50 |
| Quad ROM Cartridge for Master | £11 |
| Universal Processor Adaptor | £75 |
| Master Reference Manual I | (No VAT) £14 |
| Master Reference Manual II | (No VAT) £14 |
| Master Advance Ref. Manual | (No VAT) £19 |
| 64K Upgrade Kit for B+ | £32 |
| Acorn 1770 DFS Kit complete | £49 |
| ECONET Upgrade Kit for BBC | £42 |
| ALL ECONET UPGRADES Available | |
| ARIES' Professional IEEE Interface | £238 |
| Acorn IEEE Interface Complete | £265 |
| Morley Teletext Adaptor with ATS Rom | £99 |
| Filestore E01 £699 · Filestore E20 | £599 |
| Filestore E01 & E20 together | £999 |

### BBC MASTER COMPACT

| | | |
|---|---|---|
| System 1 | Standard Package | £299 |
| System 1A | System 1 + TV Modulator | £315 |
| System 2 | System 1 + Green Hires Monitor | £345 |
| System 3 | System 1 + Medium Res Colour Monitor | £469 |
| RS232 Kit for BBC Compact | | £25 |
| Additional 3½" Drive for BBC Compact | | £90 |

(Securicor carriage £7)

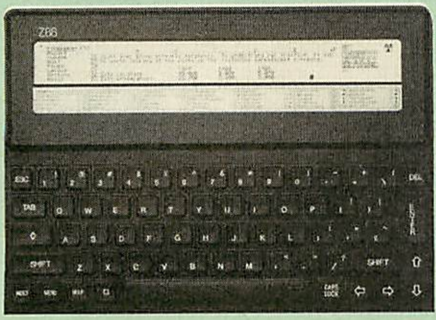
### 65C102 2nd PROCESSOR

**(65C102 replaces the original Acorn 6502 2nd Processor)**

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B. This is a complete package, with its own power supply, ready to interface with your BBC Micro.

**£159**

# Z88 Sinclair's Portable Micro



The worlds first, truly portable Micro. It is A4 size, only an inch thick and weighs under 2lbs. Ideal for use when travelling or as a personal organiser.

**Only: £239**

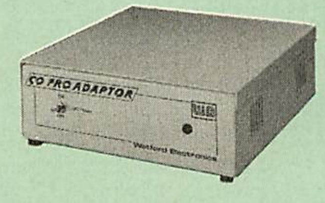
### FREE

With every Z88 purchased from us this month, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

### ACCESSORIES

| | |
|---|---|
| Mains Adaptor | £8.65 |
| 32K RAM Pack or 32K EPROM Pack | £17.35 |
| 128K RAM Pack or 128K EPROM Pack | £43.40 |
| 512K RAM Pack | £169 |
| Z88 Spellmaster for Pipedream | £51 |
| Z88 to BBC Link | £21.70 |
| Z88 to PC Link II | £30 |
| Z88 EPROM ERASER | £34.75 |
| Serial Printer Cable | £8.65 |
| Parallel Printer Cable | £24.00 |
| Z88 Modem | £145 |
| Z88 Soft Carrying Case | £8.50 |
| Sinclair Z88 Computing Book | £9.95 |
| AA Nicad Rechargeable Battery | £1.50 |
| Battery Charger, Compact & Fast (3 Hours) | £6 |

# CO-PRO Adaptor




Now for the first time you can add the Master Co-processor boards, to your standard BBC model B, or B Plus. With this brand new launch from Watford Electronics you can attach any BBC Master co-processor to the original BBC Micro. Once again Watford strides ahead with a new concept in BBC B Micro add-ons. This unique external Co-Pro Adaptor, is protected by patent applications.

Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.

With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.

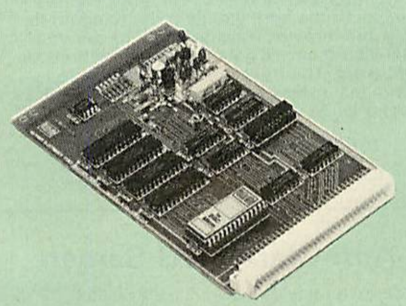
To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.

Master owners may use Co-Pro to add a second Co-processor externally.

Watford, brings power to your BBC at only:

**£35** (carr £5)

# Archimedes Real-Time Digitiser



Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air television signals may also be digitised via a video recorder or TV tuner.

Once captured, Video images can be stretched, squashed, rotated, stored on disk, printed, or used by applications software.

Applications include desktop publishing, graphics, animation, image analysis and recognition, medical imaging, automatic inspection and measurement, databases, interactive video, remote transmission of pictures via a modem, movement detection ... or anything else you can think of!

## SPECIFICATION

**SOFTWARE**

All the driver software for the digitiser is contained in a ROM on the podule. Facilities provided include:

- Grabbing of images to the screen or dumping to memory.
- Continuous grabbing and display for previewing or camera alignment.
- 'Hot key' grabbing – pressing a (configurable) key combination grabs and displays an image on the screen while another program (e.g. paint software such as Artisan) is running.
- Scaling (zoom/shrink) any section of an image to any size in X and Y directions, with optional X/Y flip, window clip and logical (AND/OR/XOR) plotting.
- Rotation and scaling to any angle and size, rotating about any point, with optional window clip, and logical (AND/OR/XOR) plotting.
- Very versatile matrix printer screendump facility for Epson FX, LQ and EX compatible printers – pictures can be printed to ANY size (including multiple sheets) at any orientation, using any available printer density and one of six internal sets of dot patterns, or with user definable patterns (pattern editor supplied). The screen-dump can also be used for general purpose graphics screen printing.
- Pixel value lookup tables: pixel values can be passed through a user defined lookup table to allow contrast enhancement, thresholding pseudo-colouring etc.
- Smoothing and noise spot removal to enhance image quality.
- Creation of sprites from all or part of a digitised image.
- Saving and loading of digitised images in compressed format.
- Combination of pictures by adding, avaraging, subtracting, multiplication etc.
- Much faster versions of the Arthur *ScreenLoad and *ScreenSave commands.

Software facilities are accessed via operating system star (*) commands and SWI calls. High resolution screen modes using MultiSync type monitors are supported.

**UTILITY DISK**

A disk is included, containing sample pictures, examples and utility programs including the following:

- Colour image grabbing using colour filters with monochrome or colour cameras, including colour balance adjustment and scaling facilities.
- Pattern editor for 2 colour display modes and printer screendumps.
- 512 line interlaced display for non MultiSync monitors.
- Thresholding to create two colour images.
- Capture and replay of animated sequences.
- Several example programs illustrating the use of digitiser software.

**RESOLUTION**

Images are digitised to 512 (h) x 256 (v) pixels, and then scaled to fit the Archimedes' screen. It is possible to digitise to 512 x 512 pixels if the picture is stationary for about 0.1 second. 512 x 512 images can either be displayed on a MultiSync monitor, or on a normal monitor using interlacing.

Pictures are digitised to 64 levels of grey (6 bits). Note, however, that it is only possible to display all 64 levels on a monochrome monitor, or a colour monitor which has a composite (CVBS) input. For this reason, the Philips CM8533 monitor is recommended instead of the standard Archimedes monitor. It is also possible to connect both a colour and a monochrome monitor at the same time.

Any 2,16 or 256 colour graphics mode can be used to display digitised pictures. In two colour modes, grey levels are represented using dot patterns, which may be redefined if required (a pattern editor is supplied). **Cont.**

**SPEED**

Video fields are captured in real time (1/50th sec.), and then transferred to Archimedes' memory or the screen. The grab/display rate is dependant on the screen mode and picture size, up to 25 fields per second for quarter screen images, or 12.5 per second for fullscreen (Mode 9).

**HARDWARE**

The digitiser is a single width podule, with a BNC socket on the rear panel for the video input, which may optionally be terminated via a link. There is 128K of on-board memory to store the digitised image, and a 32K ROM on the podule contains all the driver software.

Automatic video level control and black level clamping circuitry is used to ensure that the optimum contrast is obtained from a variety of video sources. A filter is included to avoid patterning effects when using colour sources.

**Price £249**

**Watford Electronics are Appointed & Authorised DEALERS / REPAIR CENTRE for Acorn Computers Ltd Microvitec Monitors Panasonic Printers**

NEW

# BBC PCB DESIGNER

**At last! A PCB design package for the BBC Micro that eclipses some industry CAD software. Hard to believe, isn't it? Just look at some of the impressive package specification:**

- Library Component Designer
- Component Library (over 200 parts)
- Component List Editor
- NetList Editor
- PCB Board Designer
- Plotter Driver
- Dot Matrix Printer Driver

This integrated suite of programs is packed full of sophisticated PCB related features making the design of a circuit board a dream instead of a nightmare.

Input for the design may be manual or Auto mode.

Some of the PCB Designer's features are:

- Over 120 library pad sizes/shapes
- Four colour adjustable palette
- Zoom range 2:1 to 1:4
- Highlighting of specific tracks
- Normal and surface mounted components
- Rapid screen review
- Menu driven
- Variable gridlock
- Switchable measurement grid
- Pre-select pan/scroll facility
- Large 24" x 24" Board size
- Copy route facility
- Connectivity held at all times
- Ratsnesting of part connections
- Auto-plaement of text references
- Text linked to parts
- Automatic placement of vias
- Printer and plotter outputs provided
- Comprehensive manual

### TYPES OF PLOT OUTPUT

Top and bottom track artworks, top and bottom silkscreens, solder resist mask, drilling detail drawing and check plot. All these may be with pad holes on/off, scale of 2:1 or 1:1, board edge on/off, 90 degrees rotation, mirror image, width of pen, x & y offsets and batch plots to disc.

The above is only a taste of the superb features of this software, surely capturing previously unknown performance from the BBC Master computer. BBC B owners will need to fit at least one block of sideways RAM, Shadow screen memory and a disc drive. A trackerball or a mouse is also required.

**Introductory Offer: £99**

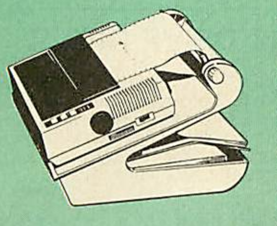
(Please write in for further technical details)

Continued →

## INTEGREX COLOUR JET PRINTER

- Colour Jet 132 Printer £515
- Paper Roll £6
- Screen Dump Software £10
- Colour Cartridge £14
- Black Cartridge £8
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £99

## Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

***80 Column version £23** (carr. £2.50)*
***132 Column version £26** (carr. £2.50)*

## PRINTER LEADS

| | |
|---|---|
| BBC Centronics 4' long | £5 |
| BBC Centronics 6' extra long | £7 |
| Compact's Special Centronics Lead | £7 |
| Archimedes Printer Lead 1 meter | £7 |
| IBM Parallel Lead 1 meter | £7 |
| Double Ended 36 way Centronic Lead | £9 |
| RS232 Leads (Various) | P.O.A. |

## PRINTER RIBBONS & VARIOUS DUST COVERS

| Type | Ribbons | Dust Covers |
|---|---|---|
| **BBC Micro** | – | £3.50 |
| **BBC Master** | – | £4.00 |
| **Archimedes Micro pair** | – | £9.00 |
| **IBM PCs pair** | – | £9.95 |
| **Brother HR15/20** | £3.00 | £5.00 |
| **DMP2000** | £3.75 | £4.75 |
| **EX/LQ800** | £4.50 | £4.50 |
| **EX/LQ1000** | £7.50 | £5.00 |
| **RX/FX80/85/800/MX80** | £3.90 | £4.95 |
| **RX/FX100/1000** | £5.75 | – |
| **Kaga/Taxan KP810/815** | £4.90 | £4.00 |
| **LC10 (Black)** | £4.25 | £5.00 |
| **LQ500/800** | £3.75 | £5.00 |
| **LQ1050/LQ2500** | £8.50 | £5.50 |
| **LX80/86/800** | £3.80 | £4.50 |
| **M1009/GLP** | £3.80 | £3.75 |
| **Panasonic KX1080/81** | £4.00 | £4.75 |
| **SQ2500** | £23.00 | £5.50 |
| **Star NL10** | £3.75 | £4.50 |
| **Olivetti Ink Jet Cartridges (set of 4)** | £9 | |

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

## *Listing Paper (Perforated)*

- *1,000 Sheets 9½" × 11" Fanfold Paper* *£7*
- *2,000 Sheets 9½" × 11" Fanfold Paper* *£12*
- *1000 Sheets 9½" × 11" NCR 2 Part Fanfold* *£19*
- *1,000 Sheets 15" × 11" Fanfold Paper* *£9*
- *1000 Sheets true A4 Fanfold Paper* *£11*
- *2000 Sheets true A4 Fanfold Paper* *£19*
- *Teleprinter Roll (Econo paper)* *£4*

*(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).*

*Carriage 1K Sheets £2.50. 2K Sheets £3.00*

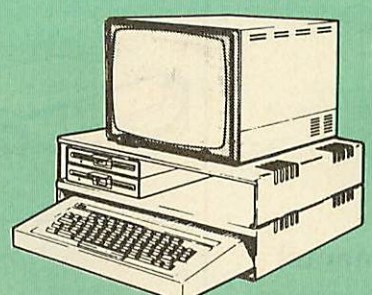
## *PRINTER LABELS*

***(On continuous fanfold backing sheet)***

| | |
|---|---|
| *1,000 90 × 36mm (Single Row)* | *£5.00* |
| *1,000 90 × 36mm (Twin Row)* | *£4.90* |
| *1,000 90 × 49mm (Twin Row)* | *£7.50* |
| *1,000 102 × 36mm (Twin Row)* | *£6.25* |

*Carriage on 1,000 Labels £1.00*

## PLINTHS FOR BBC MICRO, MASTER & PRINTERS

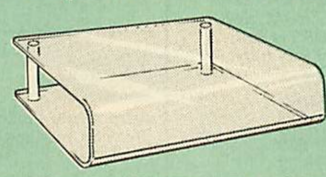


Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of coolingslots it has elegant cutouts on the sides. This allows access to paper from all sides. Colour: BBC Beige.

| | |
|---|---|
| Single BBC Plinth | **£12** (carr. £2) |
| Double BBc Plinth | **£20** (carr. £3) |
| Printer Plinth | **£12** (carr. £2) |
| Single Master Plinth | **£13** (carr £2) |
| Double Master Plinth | **£24** (carr £3) |

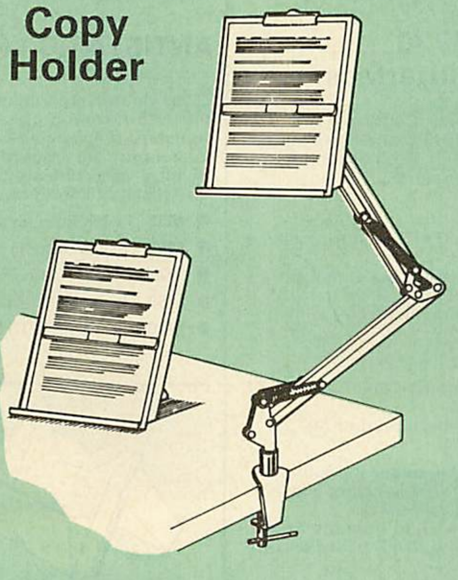
## Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand. The printer sits on top and the fanfold paper rests neatly underneath, thus occupying the same space as the printer footprint.

**Only: £16** (carr. £3)

## Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

## MEGABUFFER 256



This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

**Only £149** (carr £2)

## OKIMATE COLOUR PRINTER

The first ribbon transfer printer in its price range which offers fully versatile colour or black printing. A 24 element print head produces more than 100 shades with exceptional clarity. Ideal for use with Quest Paint or AMX Super Art.

Only: **£119**

| | |
|---|---|
| BBC Screen Dump | £10 |
| Colour Ribbon | £6 |
| Black Ribbon | £6 |

## THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

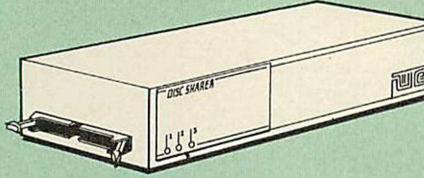
**£5.95** (No VAT)

**CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383**

Continued

NEW

## DISC DRIVE SHARER




### (Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£65** Price includes 3 Cables

### NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

## WATFORD's & ACORN's SINGLE DENSITY DFS

*Watford's popular and widely acclaimed DFS has now been available for six years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade.* ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn standard DFS). (while Acorn's 1770 DFS is fully compatible with Watford's Mk II DDFS)***

- *Complete Disc Interface Kit including DFS ROM and fitting instructions* **£48**
- *Acorn's 0.90 DFS Kit complete* **£49**
- *DFS Manual (Comprehensive)* (no VAT) **£6.95**

*(P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).*

- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17**
- *ADFS ROM only* **£25**

NEW

## Watford's MkII 1770 Double Density DFS Interface

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features:

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00**.

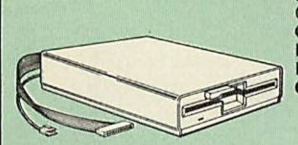
- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

## DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

## Special 40/80 Disc Drive/DDFS Mk II Offer



- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both, Single & Double Density modes.
- A comprehensive User Friendly *Manual.*

A Bargain at Only **£125** (£6 carr)
(Offer valid while stocks last)

## 3½" DISC DRIVE OFFER



These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

- **CLS35 400K Unit** **£69**
- **CLD35 800K Unit** **£126**

## Mysteries of Disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

**£5.95** (Book No VAT)

## DISC ALBUMS

Attractively finished in black leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

**£4**

## FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

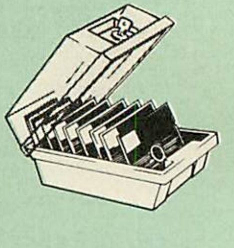
**£6**

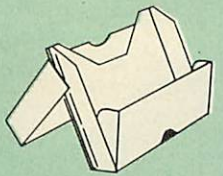
## ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** - holds upto 50 5¼" discs **£6.00**
- **M85** – holds upto 95 5¼" discs **£8.00**
- **M25*** – holds upto 25 3½" Discs **£5.50**
- **M50** – holds 50 3½" Discs **£7.50**
- **M10** – holds upto 10 Data Cartridges **£15**

* Not lockable





## PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

## DISC PLONKER RACK

When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5¼" Discs.



Protection at Only: **£2**

## Quality Disc Drives from Watford

*To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.*

*The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".*

*The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.*

***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

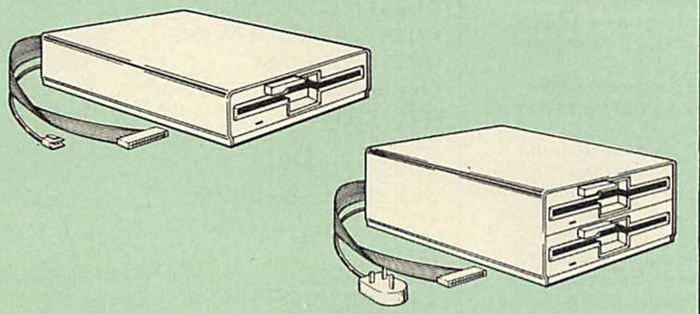
*Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.*

*If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.*

*Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!*

*When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 4th page of our advert for the Plinths).*
*P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.*

**Our Disc Drives conform to BS415**



| Capacity | Drives without P.S.U. | | Drives with P.S.U. | |
|---|---|---|---|---|
| | Single | Twin | Single | Twin |
| 200K (360K) | CLS 200 £89 | | CS 200 £98 | |
| 400K (720K) | CLS400S £82 | CLD 400 £168 | CS 400S £92 | CD400 £188 |
| 800K (1.44M) | | CLD 800S £162 | | CD 800S £182 |

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
**Securicor carriage on Disc Drives £5 to £6**

*Prefix **C** = Cased Drive*
*L = Less PSU*
*S = Single*
*D = Double*

*Suffix **S** = 40-80 Switchable*

e.g. *CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.*

**Cable to connect 5¼" Disc Drives to BBC Compact**
**Single £9 Twin £12**
**Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13**

# 3M – DISKETTES

*3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.*

- *10 × 5¼" S/S D/D 40 Track Diskettes (744)* ***£6.00***
- *10 × 5¼" D/S D/D,40 Track Diskettes (745)* ***£7.50***
- *10 × 5¼" S/S D/D 80 Track Diskettes (746)* ***£11.50***
- *10 × 5¼" D/S D/D 80 Track Diskettes (747)* ***£11.75***
- *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT* ***£19***
- *10 × 3½" S/S D/D 40/80 track Discs* ***£10.00***
- *10 × 3½" D/S D/D 40/80 track Discs* ***£11.75***
- *10 × 3½" High Density Diskettes* ***£37***

## TOP QUALITY 3½" & 5¼" DISKETTES

To complement our range of Quality Discs and Disc Drives, WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

- *10 × **M3** 3½" D/S D/D 80 Track Discs* ***£11***
- *10 × **M9** 3½" Double Side High Density* ***£34***
- *10 × **M4** 5¼" S/S D/D 40 Track Discs* ***£5***
- *10 × **M5** 5¼" D/S D/D 40 Track Discs* ***£7***
- *10 × **M7** 5¼" D/S D/D 80 Track Discs* ***£9***
- **10 × M8 5¼" D/S H/D Hi-Density Discs** **£14**
- *3" Double Sided Discs* ***£3 each***

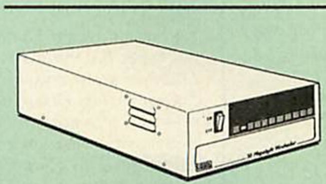
PRICES SLASHED

## Special BULK OFFER on 5¼" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

**BULK PACK DISCS in lots of 100**

| Type | S-S 40T | D-S 40T | D-S 80T |
|---|---|---|---|
| ● Without Sleeves | £35 | £39 | £45 |
| ● With Sleeves | £38 | £42 | £48 |

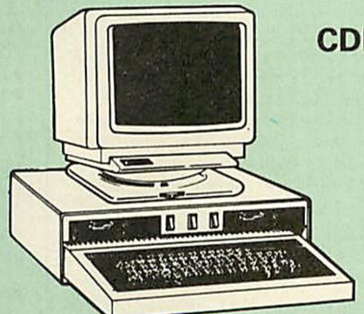


## WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.
This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a full user guide and full utilities including file copy, 1000K save routines, Format and Verify – in fact all you need and more.
Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!
Compatible with the Master, and the BBc B (with 17 X disc interface).

● 10 Megabyte **£350**; ● 30 Megabyte **£420**

**CDP800S** **CDPM800S**

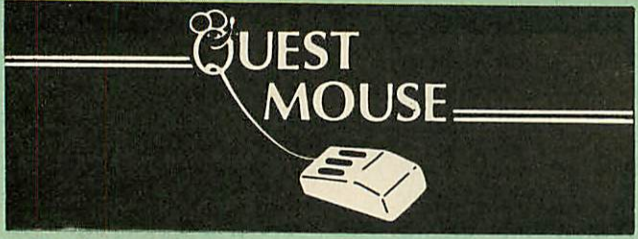


Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

**CDP 800S for BBC Micro £192**
**CDPM 800S for Master £196**
**DP35-800 for BBC/Master £165**
(For DP35-800S spec. see Page 8 of our advert)
*(Securicor Carr. £7)*
(The above drive units are 2 Megabytes unformatted)

**Continued** →

NOMINATED FOR MICRO COMPUTING BRITISH AWARDS 1987




## QUEST MOUSE

*The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and its RUBBER COATED STEEL BALL is smooth and easy to use on virtually any work surface. This also eliminates any directional bias that one encounters on the most well-known mouse for the BBC. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.*

*The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.*

## QUEST PAINT

*The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.*

*The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.*

### SOFTWARE FEATURES

*The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.*

*Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.*

*Take The Guesswork Out of Selecting a Mouse Package*
*With reviews like this how can you go wrong.*

***Popular Computing Weekly, 9-11 June '87***
*"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."*
*"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."*

***Micro User June '87***
*"Quest Mouse and Quest Paint can hold their heads high in the market. . ."*

***A&B Computing June '87***
*". . . Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package..."*

*". . . you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."*

*"What we have here is probably the best art package there is for the BBC Micro . . ."*
*"Quest Paint is a major leap forward in BBC programming. . ."*
*"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".*

***Acorn User, September '87***
*"The mouse (Quest) performs well in the face of competition from AMX, Wigmore and the rest . . ."*
*". . . this package represents excellent value for money. If you are interested in art then this program is for you to buy".*
*"Given time, I can see no reason why Quest Paint shouldn't take on the title of the definitive art package available for the BBC Micro to date".*
*"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require".*
*"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function".*
*"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford".*
*"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus . . ."*
*"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides".*
*"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program". The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package".*

***John Kilby, Head of Computer Science, Bishop Wulstan High School, Rugby, writes:***
*"Quest has been an excellent piece of equipment. The problem that seems to occur everyday is that at lunchtime the pupils rush to the computer room to make sure that they are first in the queue for the 'Quest' mouse".*

***Lt. Col. C.G. Holton, HQ 1 (BR) Corps, BFPO 39, writes:***
*"As ever your service is superb and the Quest Mouse proves every bit as good as the adverts claim".*

***Beeblet User Group, New Zealand Oct '87:***
*"One of its nicer features is that the top menu is done in Mode 0, the drawing itself is in Mode 1. Thus on screen together are two different Modes. A neat way around an old problem".*

*"PAN is used when a larger than one screen size image is required. The mind boggles at an A3 size drawing".*

*"I like it partly because of the mouse itself which is smooth and easy to handle but mainly I suppose because of the features I longed for and previously never got. Its easy to use with almost everything at your fingertips from the mouse. The software is simple where needed and complex where complexity is required".*

## ConQuest

*Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.*
*Some of the features are:*

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

| | |
|---|---|
| **QUEST MOUSE & QUEST PAINT** | **£54** |
| **QUEST MOUSE, QUEST PAINT, AMX PAGEMAKER & PAGEFONT** | **£82** |
| **QUEST MOUSE ONLY** | **£25** |
| **QUEST PAINT SOFTWARE** | **£32** |
| **QUEST FONT DISC** | **£12** |
| **ConQuest 32K ROM Package** | **£29** |
| **QUEST MAT** | **£3** |
| **Part-exchange your old Mouse for a New QUEST MOUSE for only** | **£23** |
| **GXR ROM for BBC Micro** | **£22** |

*N.B.*
*1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.*
*2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.*

## MARK II LIGHT PEN




*Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.*

***Price Only £21***
*(Price includes FREE software Disc and Operating Manual)*

## RB2 Marconi Tracker Ball

| | |
|---|---|
| RB2 (AMX/Quest compatible) | £52 |
| RB2 including Quest Paint | £78 |

## FLEET STREET EDITOR

| | |
|---|---|
| Software pack for BBC Micro | £33 |
| Software pack for the Master | £39 |
| Software Pack for Compact | £40 |
| Admin Xtra Disc Utility | £13 |
| Walt Disney Disc Utility | £13 |
| Fonts N Graphics Disc Utility | £13 |

## *THE NEW Mk III AMX MOUSE*

**ONLY: £59** **Inc. Super Art package**
(carr £1.50)
*(Please specify for BBC, Master or Compact)*

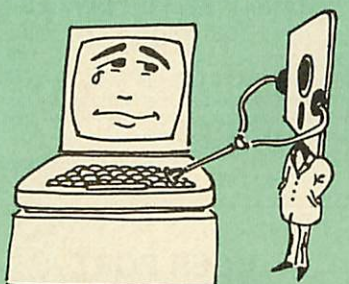
FREE our popular Colour Art software pack worth £15 with every AMX Mouse package purchased from us.

| | |
|---|---|
| MOUSE MAT | £3 |
| AMX MOUSE ONLY | £29 |
| AMX UTILITY Package | £11 |
| AMX SUPERART Package | £34 |
| AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse | £32 |

We are giving away absolutely FREE, our PAGE-FONT disc with every purchase of STOP PRESS from us.

| | |
|---|---|
| PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker | £12 |
| AMX DESIGN (ROM) | £55 |
| AMX 3D ZICON Disc | £19 |
| AMX XAM Educational | £15 |
| AMX EXTRA EXTRA | £16 |
| AMX MAX A gem of desktop (ROM) | £15 |

## DIAGNOSTICS DISC



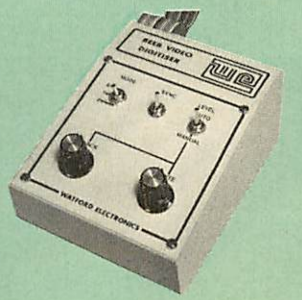
The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb: RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

**Only £20.00**

## *BEEB* VIDEO DIGITISER




Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package i designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

**£109** (Carr. £3)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

## *Magazine Maker*

(As seen on TV)

A combination of the Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

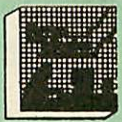
Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)

## *OFFICE MASTER*



**CASHBOOK** – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

**FINAL ACCOUNTS** – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

**MAILIST** – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

**EASILEDGER** – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

**INVOICES & STATEMENTS** – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

**STOCK CONTROL** – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

## *OFFICE MATE*



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

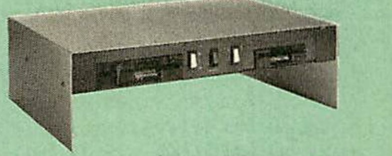
**DATABASE** – Set up a computerised card index system with powerful search facilities.

**SPREADSHEET** – Offers many calculation and editing features.

**BEEBPLOT** – Provides visual representation from Spreadsheet data.

**OFFICE MATE Only £10** (Disc)

## Disc Drives DP35-800S



A Double disc drive – with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. For ease of access, the switches are front mounted. DP35-800S has its own power supply, independent of the BBC Micro.

Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format – currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

Launch Offer: **£165** (carr. £7)

**Continued** →

# ARIES CORNER

## B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

● Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£80** (carr. £2)

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## Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

| | |
|---|---|
| Price: Aries B-12 | **£40** |
| Aries B-12C | **£5** |

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## ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

**£238** (Carr £3)

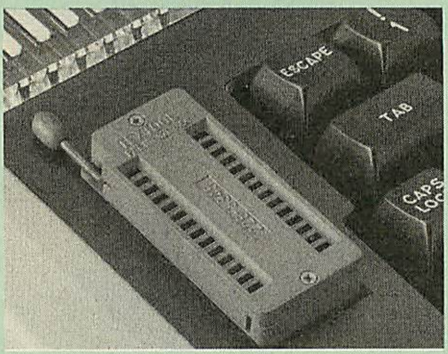
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## EXTERNAL ROM BOARD for BBC MASTER

This external Beige finished, free standing cased unit with its own Power Supply allows you to plug-in upto 12 ROMs and 16K Sideways RAM.

Only £78

## SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

● Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

● The low profile of the socket allows unrestricted access to the Keyboard.

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

● BBC, B+ and Master compatible.

ONLY **£16** (carr £2)

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## Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

| | |
|---|---|
| ● Complete System | **£11** |
| ● Spare Cartridges | **£2.50** |
| ● Spare Rack | **£1.50** |

**ROM Cartridges for the BBC Master**
Twin **£8**; Quad **£12**

## 16K DISC RAM

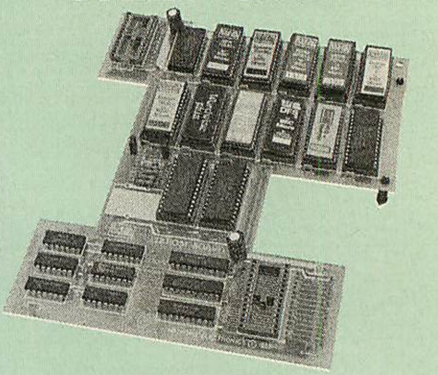
Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- Supplied complete with Battery Backup.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£35** (carr £2)

P.S. 16K Disc Ram Board is not designed to work in conjunction with a Sideways ROM Board.

## SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from *BBC* leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

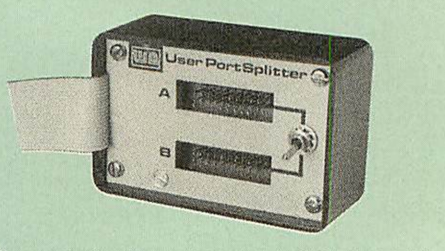
**Price: Only £32**
Battery backup fitted **£36**
Battery Backup only **£3**
(carriage £2)

● Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

**Only: £8**

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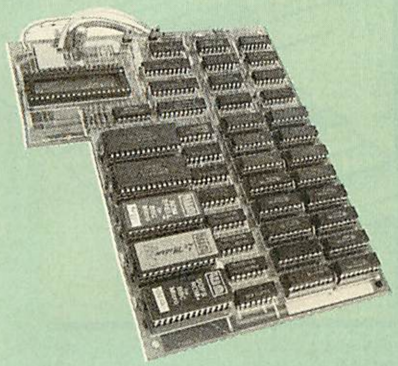
## USER PORT SPLITTER UNIT




Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£22** (carr £2)

## ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

***INTRODUCTORY PRICES:***

- ROM/RAM card with 32k dynamic RAM ...... ***£48***
- ROM/RAM card with 64k dynamic RAM ...... ***£65***
- ROM/RAM card with a massive 128k dynamic RAM ...... **£109**

(carriage on ROM-RAM Card £3)

***OPTIONAL EXTRAS:***

- 16k plug-in Static RAM kit ...... **£17**
- 16k Dynamic RAM for Upgrade ...... **£17.50**
- Battery backup ...... **£3**
- Read and Write protect switches ...... **£2** each

Complete ROM-RAM board
All options installed ...... **£115**

P.S.
**Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less**

## Le Modem




### The MODEM from Watford

*At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.*

*The features that make Le MODEM such good value are:*

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***

### SPECIAL OFFER

*Price:* ***£82***
*(carr £3)*

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

## REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

**£15** (40 or 80 track)

**Acorn's Speech Synthesiser package, complete**
**Special Offer £18**

## APOLLO

### The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£82** **(Carr £3)**

Price includes, the Modem, Comm Software Cables & Operating Manual).
(Write in for full specification)

### VOLTMACE JOYSTICKS

| | |
|---|---|
| Delta 3B Single Joystick | **£10** |
| Delta 3B Twin Joysticks | **£15** |
| Delta 3C Joystick for Compact | **£10** |
| Delta 14B Single Joystick | **£11** |
| Delta 14B/1 Adaptor Module | **£12** |
| Transfer Software Disc-Tape | **£7** |

### ATTACHE CARRYING CASE

For the BBC Micro. Attractively finished in antique brown leatherette. Lockable.
Only **£10** (£2 carr.)

### Versatile BEEB SPEECH SYNTHESISER Unit




The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

**SPECIAL PRICE £32** (carr £2)

**Continued →**

## COMPUTER CONCEPT'S ROMS

| | |
|---|---|
| ACCELERATOR | £46 |
| CARETAKER Basic Utility | £23 |
| DISC DOCTOR | £28 |
| Graphics ROM | £29 |
| TERMI | £25 |
| COMMUNICATOR | £49 |
| SPEECH SYSTEM | £35 |
| Printmaster | £25 |

**Wordwise** £23

**Wordwise plus** £40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

## Word-Aid

### The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

**HI-WORDWISE-PLUS DISC:** £5

**SPELL MASTER** £42

**Inter SHEET** ONLY £37

**INTER CHART** ONLY: £25

**Inter-WORD** £36

## MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM £76

**INTERBASE £49**

All Prices Exclusive of VAT

## VIEW

| | |
|---|---|
| VIEW WORDPROCESSOR 2.1 | £35 |
| **VIEW 3.0 ROM** | **£48** |
| **VIEW PROFESSIONAL** | **£59** |
| **HI-VIEW** (for 6502 2nd Processor) | £36 |
| **VIEWSHEET (Acornsoft)** | £36 |
| **VIEWSTORE** | £36 |
| **VIEWSPELL with 80 track disc** | £29 |
| **VIEWPLOT Disc** (Please specify for Master 128 or Compact) | £20 |

**CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383**

| | |
|---|---|
| **VIEW-INDEX** | £12 |
| **OVERVIEW Packs 1 & 2** | £69 |

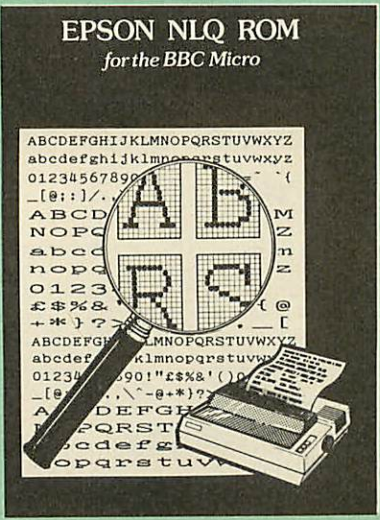
### Watford's own Sophisticated VIEW PRINTER DRIVERS

| | |
|---|---|
| Epson FX80 & Kaga KP (Disc) | £8 |
| Juki & Brother HR15 (Disc) | £8 |
| Silver Reed Printers (Disc) | £8 |

### MINI OFFICE II

| | |
|---|---|
| DISC Version for BBC B & B+ | £14.00 |
| DISC Version for BBC Master | £16.50 |
| ROM Version | £43.00 |

(When ordering please specify for which Micro & 40 or 80 track Disc).



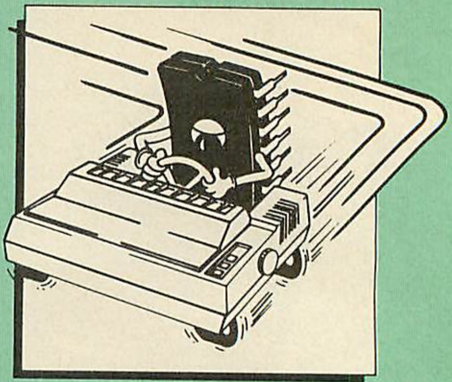

Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

*(Send an SAE for sample printout)*

**Only: £25**

VIEW PRINTER DRIVER for NLQ ROM £7

## VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

**Price: Only £33**

## ROM-SPELL

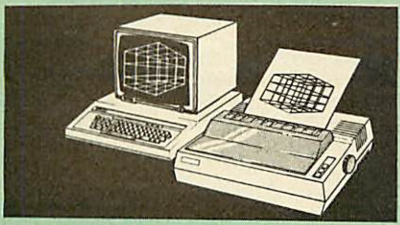



Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.

*NOT compatible with 1770 DFS.*
*(Please state 40 or 80 track disc)*

**Price still only: £25**

## DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered and User Port triggered dumps

*The Micro User Feb. 1985.*
*'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".*

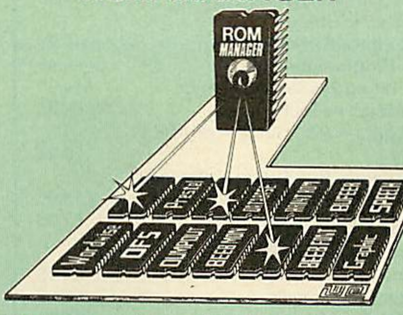
For use with the following printers:
GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles.

**Only: £25**

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- Espana Viva – 3 Discs **£19.95**
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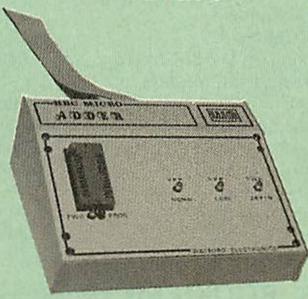
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Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
*"Provides comprehensive management of all your installed ROMs".* (BEEBUG November '84.)

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## ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.

Features:

- Two ultra fast programming algorithms or standard slow algorithm.
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- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

**£75** (£3 Carr)

## TEX EPROM ERASERS

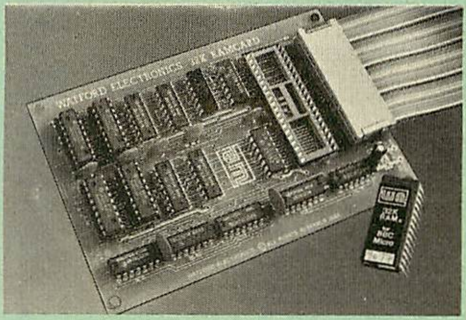
EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
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- Spare UV tubes. **£9**

# 32K

## SHADOW RAM-Printer Buffer

### Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

**Only £59** (carr £2)

(Price includes a comprehensive manual and the ROM)

## INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

Continued →

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NEW

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At last Acorn's long awaited Advance Reference Manual for the BBC Master Series of Microcomputers has now been published. Watford Electronics' own authors have edited and added missing sections to the original script and produced a very high quality publication.

It features information about:

- Memory Organisation
- Slow data bus
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- Second processors – Internal, Z80 and 80186
- Disc Filing Systems
- ANFS
- Terminal Emulator & Editor
- View internal format
- Detailed differences between Model B, B+, Master 128K and Compact
- Comprehensive appendix on 65C12 instruction set

At the rear of the manual there are pull out circuit diagrams for the Master 128K.
A worth-while addition to any Master owner's library.

**All this for just £19 (NO VAT)**

## THE COMPLETE BBC COMPUTER USER HANDBOOK

*"Why has no-one written a book like this before? It's long overdue".*
If you own a BBC-B, BBC B+, Electron, Master 128, Master Compact or Archimedes then this book is for you. It shows you how to get the most from your computer, and how to make the computer work for you. Although some sections are machine specific, most of the information, programs, hints and good solid experience are for the whole range of BBC machines. The general style and level means that both beginner and expert will feel satisfied with the quality and quantity of the material.

**GENERAL** – Uses and abuses of computers.

**HARDWARE** – How to design your own work station. Hardware additions (disc drives, ROMs, printers, 2nd processors, etc). DIY alterations.

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### Servisol Foam Cleaner

This 415Ml, king size multi-purpose foam cleaner spray is ideal for cleaning the Keyboard, Monitor, Disc Drive and your computer furniture surfaces. Simply spray on the surface to clean and wipe off with a clean cloth.

### Antistatic Aerosol Spray

Ideal for cleaning and preventing static build-up on TV/Monitor Screens.

**£2.50**

### Aerosol Dust Spray

Aerosol Dust Spray
This simple to use aerosol spray is ideal for removing Dust and Dirt deposits from the Keyboards and similar inaccessible places. **£3**

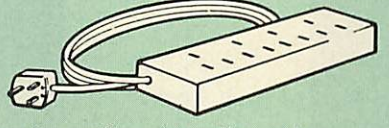
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Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources which put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£7.50**

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4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals.

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### SPIKES CLEANER UNIT

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete computer system

**£13.00** (carr. £1.50)

### ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip.

**£2**

### Replacement FLEXIBLE 17 way Keyboard Connector £3

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SOLDER type **£1.50**; IDC CRIMP type **£1.95**

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Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ Keyboard.

Only **£1.00**

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### Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below).

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### CONNECTING LEADS

(All ready made and tested)
CASSETTE LEADS 7 pin DIN Plug

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| to 5 pin DIN Plug + 1 Jack Plug | £2.00 |
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**DISC DRIVE POWER LEADS**
Supply from BBC power supply to standard Disc Drive connector.
Single **£3.00** Dual **£3.75**

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| | Plugs | Sockets |
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| Cassette (7 pin DIN) | 25p | 65p |
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| Paddles (15 pin 'D') | 80p | 200p |
| Disc Drive Plug 4 way | 75p | – |
| 6 way Power Connector | 80p | 95p |

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# GETTING YOUR LINES CROSSED

**Have you ever wanted to create your own crossword? Here is something that may help you do just that**

***Joe Telford***

The impetus for this month's program came from two sources, over 12,000 miles apart. I'd just unearthed a pile of readers' letters that I'd filed as containing potential project ideas, and was looking through them when I came to a request for a crossword-compiling program from a group of Australian readers. I'd put it down previously because the amount of programming needed struck me as being quite large. In addition I hadn't forgiven Barson's (the Australian distributor) for offering me a crate of cut-price soap at the first ever *Acorn User* show.

Then the darling daughter waltzed into the lab at the Towers with her latest holiday reading – *5001 Crossword Puzzles for your Spare Time.* There's no doubt that we like to pit our wits against the authors of such crosswords, but it suddenly struck me that there must be an equal sense of satisfaction in actually building one.

Crosswords consist of a blank grid where letters can be placed, along with a set of clues. The clues are arranged in numerical order, across then down the grid. If you look at the *Acorn User* crossword in figure 1, you'll see how this is done. Look at the way some of the squares are numbered, 1 to 19, left to right, then top to bottom.

But these are the elements which we see. What if we wanted to check the answers to a crossword? In this case the information shown in the box on page 70 would be most useful to us. This allocates words to the grid, and lists them in number order across and down.

We're now getting to the point where we can see exactly how a crossword can be built. But there are actually two approaches, which I'll call the pattern-based and the thematic approaches.

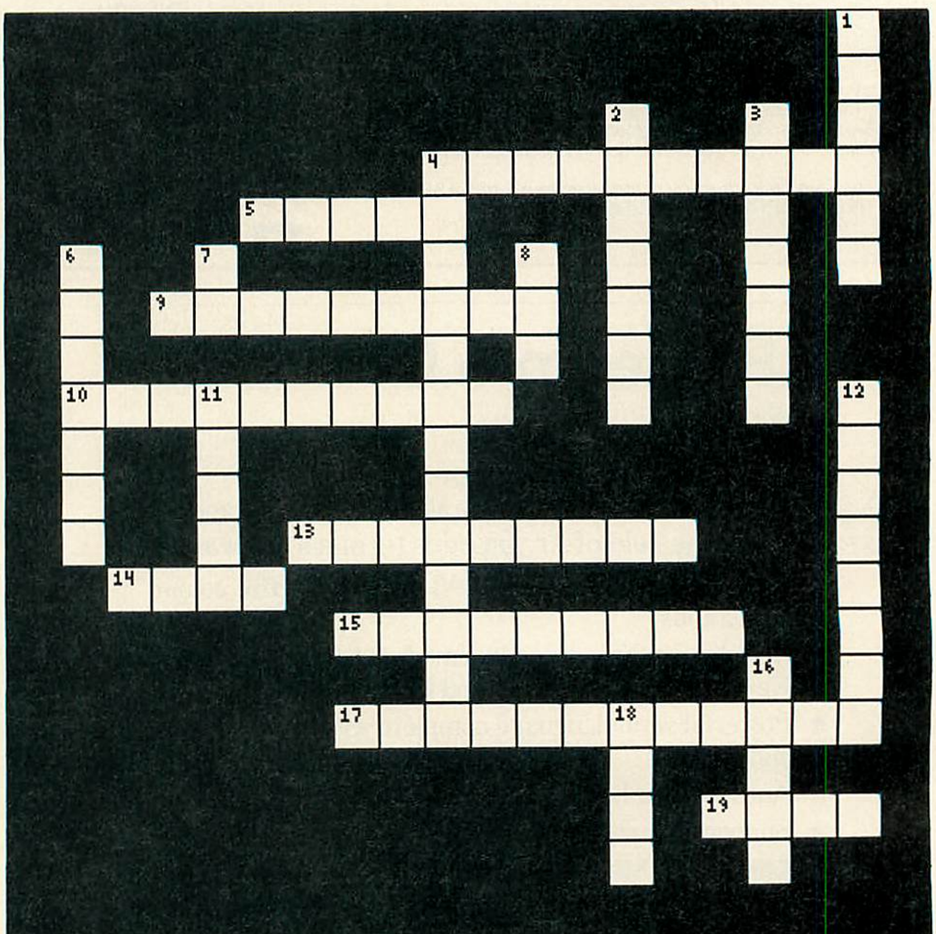


**Figure 1. Try and solve the *Acorn User* crossword**

The pattern-based approach is illustrated in figure 2. This layout, common to many newspapers, is based on first designing a regular grid of squares, then filling the grid with any words at all, so long as they fit. Once done, the squares are numbered and clues added. However, using a computer to design such a crossword would require access to a very large dictionary, like *ViewSpell* or *SpellMaster.*

The thematic approach puts more emphasis on the words which are intended to be used in the crossword. These crosswords are more likely to appear in special interest magazines because they are developed around a theme. Figure 1 is a thematic crossword, and this article deals only with this type. Really keen readers might like to

work on the ideas here, to modify them for pre-designed patterns.

To build a thematic crossword, you first have to select the words which you want your audience to guess. This is an important task, because the words should be within the ken of most of the audience, or if not, easily guessable from the clues. Next, these words have to be laid down on a grid, so they overlap with at least one other word – like adding words in Scrabble. This is a process of sorting, matching and counting. Each word has to be given a number, depending on its position in the grid, and then grouped into Across and Down words. Finally a clue has to be designed for each answer in turn. This marks the end of the design process, but the crossword has to go through two presentation stages, where the blank is drawn up and the clues added.

Of these tasks, choosing the words and designing the clues are best done by you, but most of the other work can be delegated to your micro. The computer replaces only the activities which don't require creative thought, and you retain the management role to make sure the system is followed.

The programs are designed to run on any BBC micro with shadow screen memory; for a standard BBC micro a crunched version of program 2 is needed. If you intend typing the published version into a model B or Electron without shadow memory, then you'll need to compact the second listing with a toolkit program. The programs will work on NET or ADFS, but you will need to create directories W,X and C beforehand, and on certain machines (Electrons or model B machines with ADFS for example) you won't be able to set PAGE low enough to run them. Because the programs generate files, I recommend that you allocate a whole disc to this package. Type in or copy the first program – CWD1 – and save it on the disc. Type in (and crunch if necessary) the second program, CWD2-c, or copy it, and save it too. Then *BUILD the !BOOT file:

```
*BUILD !BOOT
0001 *BASIC
0002 *SHADOW 0
0003 MODE 4
0004 CHAIN "CWD1"
ESCAPE
*OPT 4,3
```

## Using the crossword generator

When CWD1 runs, a title page appears and prompts you to press Space. The title page will disappear and the second program will then load. Notice that the program is generally window-based: all commands and input are via windows.

The main keys to use with a menu are the cursor up and down keys, with Return confirming your choice. The Escape key always cancels whatever you're doing, and gets you back to the last menu. Sometimes you are invited to press other keys or to type words – these are always clearly indicated, and unless you press Break or Escape by accident, you can't go wrong.

CWD1 has two important functions. First, it sets up the user-defined characters, and second it sets up the maximum size of the crossword grid at a 20 by 20 square. This value is found at the beginning of the program – it is known as the M% variable. M% also sets the maximum number of words which can be entered at 20. However, advanced users might like to think how this number could be increased. The program is also a front end for the crossword generator itself.

When the main program begins, the highlight bar in the main menu indicates the 'Words' option, so you simply press Return. A further 'Actions' menu appears giving you the choice of typing in new words or loading an existing set from disc.

Choose 'New' from the Actions menu by moving the highlight bar and pressing Return. A new window opens up, into which you can type the words for your crossword. Type in up to 20 words and conclude by typing a '*' on a line all by itself. If you add the maximum number of words, the '*' isn't necessary. Once the words have been entered, the main menu reappears.

To save a word set, move the highlight bar down to 'Words' and press Return, then select 'Save' from the Actions menu, think of a filename and enter it. Wordfiles are stored in the W directory, and this is built in to the program – so a file on astronomy could be W. ASTRO. Once the name is entered, the wordfile is spooled to disc, and then the main menu reappears.

## File management

After you have selected 'Words' from the main menu, you can use the Action menu to either catalogue the wordfiles on the disc, or to delete them. Similar actions work on the clues and crossword files. Select 'Catalogue' and press Return. When the catalogue appears, the Space bar returns you to the main menu. Note that the catalogue is of one of the three directories W, C and X, for word lists, clues and crosswords, depending on what was selected from the main menu.

To delete a file, select 'Delete'. A catalogue of the relevant files will be displayed, and you just enter the file name that you want to delete, not including any directory extension, for example ASTRO. This would delete W. ASTRO, that is assuming 'Words' was picked from the main menu. The file will vanish and the main menu will reappear.

The files of words which the list program generates are saved in Ascii form, so they can be edited by your favourite wordprocessor. They can be read into *View* or *Wordwise*, spellings can be corrected and words can either be removed or added – but make sure you don't exceed 20 words. You can even create the entire wordlist with your wordprocessor and then use the 'Load' option in the 'Words' submenu to load them. This 'load from disc' option exits if you add a '*' to your word-

### CROSSWORD CLUES

**Across:**
**4: Twin hacks of 9 across (5,5)**
**5: In the meeting place. But it's all Greek to me! (5)**
**9: Column about kids for adults? (9)**
**10: Tech man rings true after off-colour meat (6,4)**
**13: The world's best magazine for users of Acorn computers (5,4)**
**14: Cambridge computer firm takes a chance (4)**
**15: The mighty one of 7 down (4,5)**
**17: Notes written down at the 'Towers' (4,8)**
**19: Front column collects facts from compass directions (4)**

**Down**
**1: Column which puts the Orson before the cart! (6)**
**2: Forest publisher may distribute in USSR? (7)**
**3: Demented dwarf with gold covered choc earrings (3,4)**
**4: Contributor of Arabia? Goliath wouldn't agree! (5,8)**
**6: Undergone some adventures below without Queen! (7)**
**7: He who must be obeyed! (2)**
**8: Connector for 11,18 down (3)**
**11: (also 8, 18 down) Column gives help – sort of clues (5,3,4)**
**12: Micro maths pack removes decimals for artists in chaos? (8)**
**16: Place to find info? (5)**
**18: Spit in confusion – see 11 down (4)**

processed file, otherwise you can add extra words to the end of the list before typing the '*' manually.

Of course, not everyone has a wordprocessor, so the program will function without one. You can also load and amend clue files with a wordprocessor; these are saved in Ascii form too. The crossword file is saved, byte by byte, and cannot be altered. Note that once a crossword file is generated the wordlist is fixed, and the original wordlist will always reappear when a crossword file is loaded. The rule is that you should consider rebuilding the crossword file whenever you change the words in the wordfile. Remember too, when using a wordprocessor, that you should save the wordprocessed file in Ascii – don't put any stored commands into the file – and words should be no more than 20 characters long. Clues in clue files should never be more than 60 characters long. The other options on the words submenu allow you to display the wordlist on screen, or print it out on your printer. Once you have finalised the wordlist, it then needs to be made into a crossword.

## Building a crossword

This is the largest part of the program, and it can take a good deal of time to complete. With a wordlist loaded, select 'Crossword' from the main menu. You then select 'New' to build a new grid. A submenu allows you to select a tight or open crossword, or the option of returning to the main menu. OPEN is an option which instructs the computer to build its grid by overlaying each new word across the previously fitted words, in the order last fitted to first fitted. This tends to result in a crossword which spreads right across the available grid space. The TIGHT option instructs the computer to build its grid by overlaying each new word across the previously fitted words, in the order first fitted to last fitted. This tends to result in a crossword which is grouped more centrally in the grid space.

Neither type of crossword guarantees a fit, as this depends on the frequency of matching letters in the words you enter, and on the randomness of the first few overlays made by the program. The building routine itself works by ordering the words by length, then laying down the longest word, near the centre of the grid. Successive words are matched randomly from either end of the first word, and progressively from either end of the later words. A counter on the screen indicates which word you are up to. If the wordcount sticks on a word near the end for an abnormally long time, say about a minute, then the chances are that the crossword cannot fit. Press Escape and rebuild. We've never yet had a crossword that couldn't be built, although the option to accept a crossword apart from a non-fitting last word is built in. In some cases this option is useful, but it does cause the last word to vanish completely.

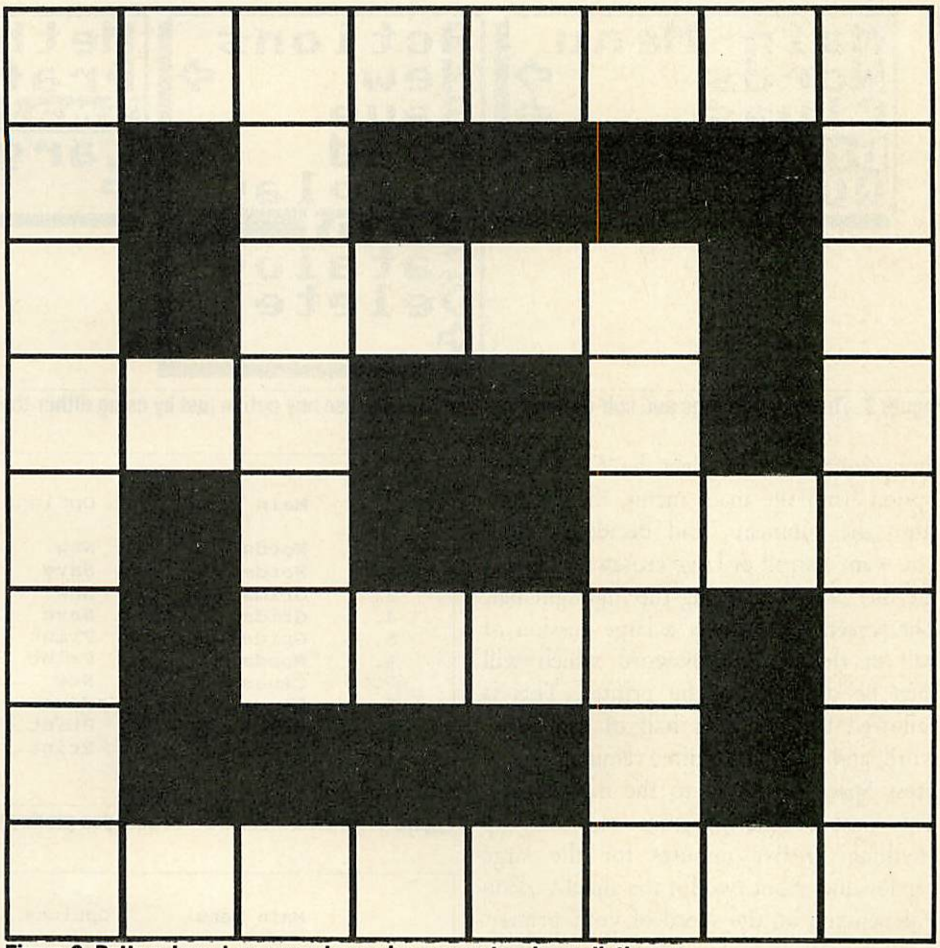


**Figure 2. Pattern-based crosswords require access to a large dictionary**

Once the crossword has been built, the program automatically numbers the grid, sorts the wordlist by number, then groups them into words across and words down. The main menu reappears at this point, although the program tells us where it is at every step of the way. It is now best to save the crossword, by selecting 'Crossword', then 'Save' from the menus. In the example of an astronomy crossword we might use the filename X. ASTRO, where X is the crossword directory. 'X' is added automatically by the program.

Once you've got the crossword saved, you need to prepare the clues. I find that this task can be made easier if I first go to the Words menu then select 'Print', to get a list of the answers, then select 'Crosswords', and 'Print'. At this stage, a new submenu appears offering a draft of the grid – select this. Now I can see the relationship of words and the crossword, and take this into account when actually composing clues.

Normally clues are added by selecting the 'New' sub-option of the 'Clues' section, and this prompts for each clue by giving the word and its corresponding number in the crossword. The clues must be typed using anything up to 60 characters per clue.

For safety's sake I recommend saving the clues as soon as they are entered, so you select 'Clues' then 'Save', and in our astronomy example we would type the name ASTRO to save them as C. ASTRO.

You can now leave the computer and come back to perform your print-out later, or you can continue and print it out now. The only difference is that if you restart the computer, you must reload the crossword using the 'Load' option in the 'Crossword' submenu, and the clues with the one in the 'Clues' submenu.

## Displaying the crossword

To print it all out, make sure the printer is ready. It should be Epson FX-compatible – if not, you'll have to rewrite the PROC-

## JOES JOTTINGS

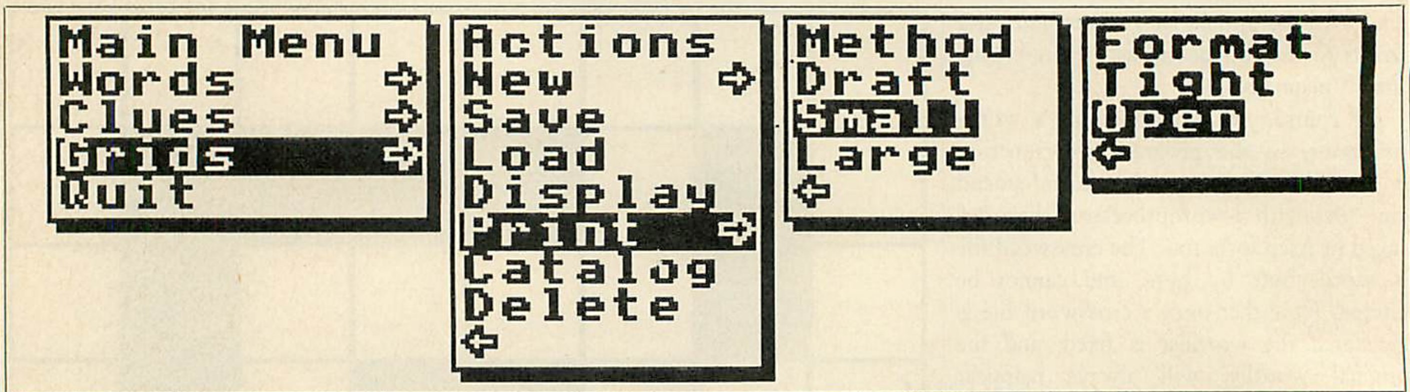



**Figure 3. The major options and sub-options you can use. Choose any option just by using either the up or down cursor key**

dump routine. Then select the 'Crossword' option from the main menu, then 'Print' from the submenu, and decide whether you want a small or large crossword. Select the one you want using the highlight bar. The screen will display a large version of half of the blank crossword which will then be dumped to the printer. This is followed by the other half of the crossword, and finally the chime reminds you to press Space to return to the main menu. This part of the program can take up anything to five minutes for the large version and about two for the small version – depending on the speed of your printer. A small routine looks at the screen before printing begins, to reduce the amount of entirely black lines, and this can save a lot of time in small crosswords, and is a major reason why I've never found it necessary to alter the size of the crossword.

Once the crossword is dumped, you can reselect 'Clues', then 'Print'. This gives us an immediate hard copy of the clues, underneath the crossword. If we use the small crossword option, then both crossword and clues will fit on an A4 sheet of paper. With a large crossword, the program does a form feed after printing the grid, so the clues go on the next sheet.

While the above explains how the program works in detail, figures 4 and 5 are aide-mémoires to remind you of the stages necessary for producing your own crosswords. Remember that the computer tells you where you are every step of the way, and that the Escape key aborts any activity. If you Escape in the 'Enter words' section, the words, crossword and any clues are destroyed. If you Escape in the 'Build crossword' section the same happens, but if you Escape in the 'Enter clues' section, only the clues go.

I hope you enjoy working with this package – and particular thanks to our Australian readership for suggesting the topic in the first place!

| | Main Menu | Options | Other |
|---|---|---|---|
| 1. | Words | New | |
| 2. | Words | Save | |
| 3. | Grids | New | Close/Tight |
| 4. | Grids | Save | |
| 5. | Grids | Print | Draft |
| 6. | Words | Print | |
| 7. | Clues | New | |
| 8. | Clues | Save | |
| 9. | Grids | Print | Small/Large |
| 10. | Clues | Print | |

**Figure 4. An aide-mémoire – to help you produce your crossword quite easily**

| | Main Menu | Options | Other |
|---|---|---|---|
| 1. | Grids | Load | |
| 2. | Grids | Print | Small/Large |
| 3. | Clues | Load | |
| 4. | Clues | Print | |

**Figure 5. All the necessary stages are shown to help you**

### Crossword Answers

```
******************A*
******************B*
*************R**M*U*
*********DRAGEEVANS*
*****AGORA***D**D*E*
*D**E****V*A*W**A*R*
*U*EDUCATION*O**L***
*N*******D*D*O**E***
*GRAHAMBELL**D**X*F*
*E**I****A********R*
*O**N****W********A*
*N**T*ACORNUSER***C*
**RISC***E********T*
*******TONYQUINN**A*
*********C******I*L*
*******JOESJOTTINGS*
*************I**D***
*************P*NEWS*
*************S**X***
********************
```

Across:

4: DRAGEEVANS
5: AGORA
9: EDUCATION
10: GRAHAMBELL
13: ACORNUSER
14: RISC
15: TONYQUINN
17: JOESJOTTINGS
19: NEWS

Down:

1: ABUSER
2: REDWOOD
3: MADALEX
4: DAVIDLAWRENCE
6: DUNGEON
7: ED
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Spy Vs Spy.....(Helpsheet)
Spellbinder.....(Solution + maps)
Elixer.....(Solution + maps)
Paperboy.....(Helpsheet)
Twin Kingdom Valley.....(Solution + map)
Omega Orb.....(Solution + map)
Elite.....(Helpsheet + tips)
Tarzan.....(Solution + map)
Stranded.....(Solution)
Codename: Droid.....(Solution + map)
Thunderstruck.....(Solution + map)
Thunderstruck 2.....(Solution + map)
The Lost Crystal.....(Solution)
Suds.....(Solution)
Kourtyard.....(Helpsheet + map)
Dunjunz.....(Helpsheet + map)
Gisburnes Castle.....(Solution + map)
Palace of Magic.....(Solution + map)
Impact.....(Helpsheets + passwords)
Icarus.....(Helpsheet + maps)
Sphinx Adventure.....(Solution)
Anarchy Zone.....(Helpsheet + passwords)
Philosopher's Quest...(Solution + map)
Repton 2.....(Helpsheet + 18 maps)
Bonecruncher.....(Passwords + 10 maps)
Skirmish.....(Helpsheet)
Imogen.....(Solution)
Cholo.....(Solution)
Quest for Freedom....(Solution + map)

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(Superior)

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| BBC 5 1/4" Disc | £9.50 |
| Master Compact 3 1/2" Disc | £11.95 |

**NEW**

*= Electron disc available
M = Master compatible

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| Play It Again, Sam 3 M | 7.50 | 9.50 | 11.95 |
| Pipeline M | 7.50 | 9.50 | 11.95 |
| Repton Thru Time M | 5.50 | 6.35 | 7.50 |
| Barbarian M | 7.50 | 9.50 | 11.95 |
| Spycat M | 7.50 | 9.50 | 11.95 |
| Quest M | 7.50 | 5.95 | 11.95 |
| Play it Again Sam 2M | 7.50 | 9.50 | 11.95 |
| Bonecruncher M | 7.50 | 9.50' | 11.95 |
| Spellbinder M | 7.50 | 9.50' | 11.95 |
| Play it Again Sam M | 7.50 | 9.50' | 11.95' |
| The Life of Repton M | 5.50 | 6.35' | 7.50 |
| Elixir M | 7.50 | 9.50' | 11.95' |
| Palace of Magic M | 7.50 | 9.50' | 11.95' |
| Repton Around the World M | 5.50 | 6.35 | 7.50 |
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| Acorn Hits Vol 1 or 2 M | 4.95 | 9.50 | 11.95 |
| Sup. Coll. 1 or 2 (BBC only) M | 7.50 | 9.50 | 11.95 |
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| Ravenskull M | 7.50 | 9.50 | 11.95 |
| Thrust M | 3.99 | 9.50 | 11.95 |
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| Oxbridge M | 6.35 | - | - |
| Commonwealth Games M | 6.35 | 10.35 | 10.35 |
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| Microvalue 2 (4 games) Elec Only | 3.99 | - | - |
| Microvalue 3 (4 games) Elec Only | 3.99 | - | |
| Microvalue Gold | 3.99 | | |
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| Micropower Magic 1 M (BBC Only) | 5.95 | 5.95 | 5.95 |
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M = Master compatible

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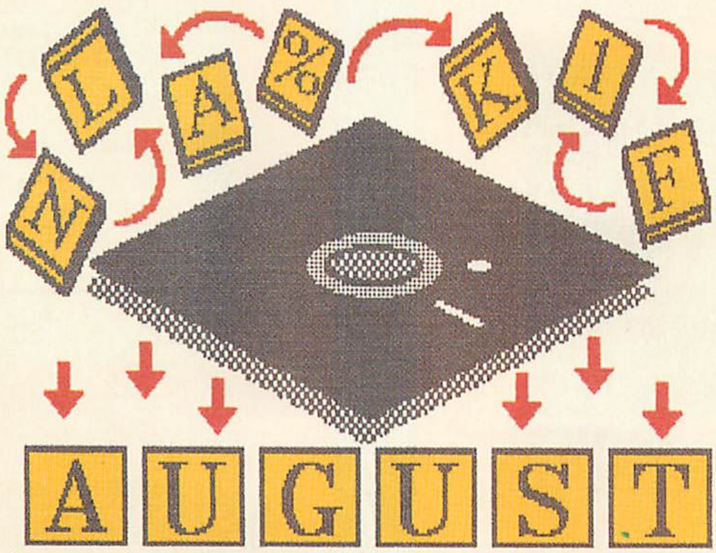
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# MAKING MOVES

**Transferring files is becoming increasingly difficult as the number of wordprocessors increases. A standard file format may be the answer**

***Dave Lawrence***




Transferring files between wordprocessors has always been tricky to say the least. Practically every wordprocessor stores its text in a different way and the chances of formatting and layout commands being the same are very slim indeed. On a small scale, even the differences between *View* and *Wordwise* make moving files between the two awkward. Now, with the advent of the Archimedes and its slowly growing number of wordprocessors, file transfer is becoming almost impossible.

I actively use three different word processors – *Pipedream* on the Z88 (when I'm on the train), *View* on a BBC (when I'm in the office) and *First Word Plus* on the Archimedes (when I'm at home). I'm planning to move completely over to *Pipedream* on the Archimedes, but before I actually do, I need a utility to move files between the three.

I could use the 'Save as plain text' options and then 'read' my files in as straight Ascii. This will work fine, but I would lose all my page layout, formatting and highlighting commands.

I could have written six transfer programs to convert between all the possible combinations of formats, but this would take too long and is not easily expanded on. For example, I might suddenly have to use a new WP such as Microsoft's *Word*, then if I wanted to transfer files between this and all my existing WPs I'd have to write another six converters!

Instead of these two options, I decided to define a 'standard' wordprocessor file that contains all the elements necessary for specifying layout, formatting and highlighting and then, for each WP, write two utilities, one to translate to this format and one back again. So, although I'd still need to write six programs for my initial WPs, if I ever had to use any more I'd only need to write two more converters.

This approach is rather like the UNCOL programming language. This was a standard intermediate language proposed in 1958. It was envisaged that languages such as C and Pascal would compile to UNCOL with the 'front end' compiler, and then a 'back end' compiler would be used to convert the UNCOL source into the machine code for the relevant machine. Thus if a new language was invented, then only one compiler need be written – one from the language to UNCOL. Likewise if a new machine was built, only one compiler need be written – from UNCOL to the machine. (There is an UNCOL compiler for the Archimedes as well as an ARM back end. . .!)

BBC Enterprises has been working on a simplified general format called *UniForm*, however this is really just a superset of Ascii and not really suited for transferring WP files. Instead of using this, I have defined my own format called *August* – the *Acorn User* Generalised Utility for Script Transfer. This is based on the *UniForm* standard, but is enhanced to include page layout and highlighting commands.

*August* files consist of 8-bit Ascii text. The only 'control' characters (Ascii codes less than 32) that are used are 'tab' (Ascii 9) and 'cr' (Ascii 13). All the *August* constructs are introduced by a 'Control Sequence Indicator' (CSI) '¦' (the double bar) and are terminated by a 'Control Sequence Terminator' (CST) '$'. This allows constructs to be nested. Paragraphs are stored as solid text with no soft spaces or carriage returns. This is done because it is expected that the destination WP should have to reformat the text itself. Paragraphs are terminated by a carriage return (Ascii 13).

All measurements in an *August* file are made in thousandths of a point (1/72000th of an inch) – this is to cater for microspacing and kerning constructs.

The type of construct is indicated by the character following the CSI. There are currently nine constructs, 10 highlight commands and three special characters. These are shown in the table on page 75.

Please note, in the following section a number of example constructs are given in which extra spaces have been added to make the examples more legible.

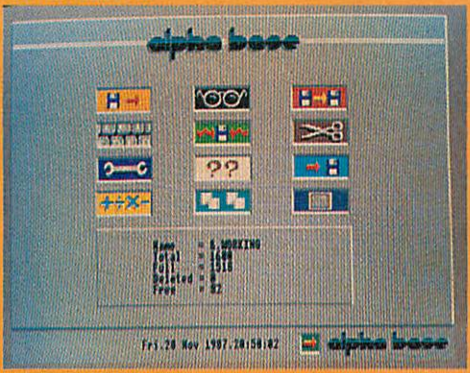
ILLUSTRATION BY JONATHAN INGLIS

# Archimedes
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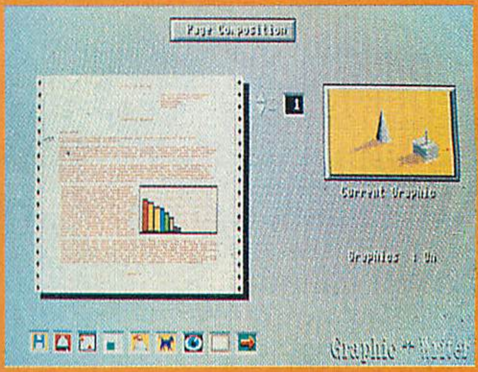

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*MICRO USER April 1988*

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**The constructs**

| | |
|---|---|
| ¦H – | Horizontal ruler (tab positions and margins) |
| ¦V – | Vertical ruler (page layout) |
| ¦T – | Header definition |
| ¦B – | Footer definition |
| ¦F – | Font specification |
| ¦E – | Expression |
| ¦J – | Justified text |
| ¦P – | Conditional page eject |
| ¦? – | Application specific data |

**The highlights**

| | |
|---|---|
| ¦0 – | Normal (reset) |
| ¦1 – | Underline |
| ¦2 – | Bold |
| ¦3 – | Light |
| ¦4 – | Italic |
| ¦5 – | Subscript |
| ¦6 – | Superscript |
| ¦7 – | Extended |
| ¦8 – | Condensed |
| ¦9 – | Small caps (user defined?) |

**Special characters**

| | |
|---|---|
| ¦ – | Literal '¦' |
| ¦$ – | Literal '$' |
| ¦* – | Page number |

**Table 1. Summary of *August* format**

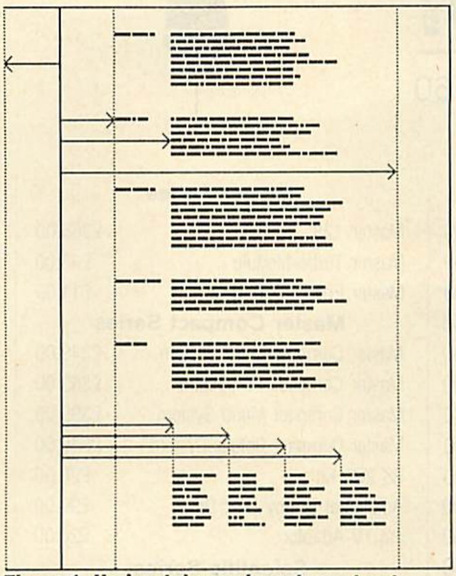


**Figure 1. Horizontal page layout constructs**

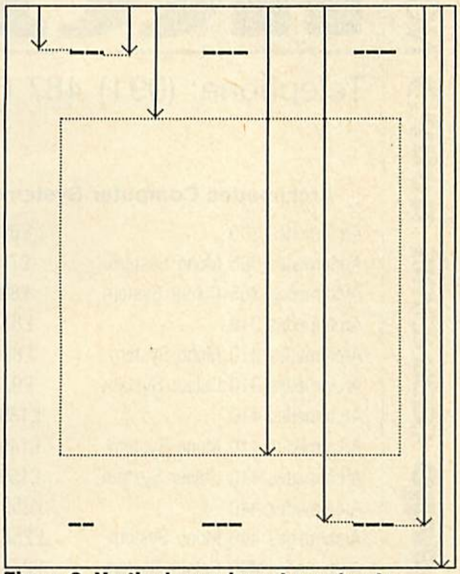
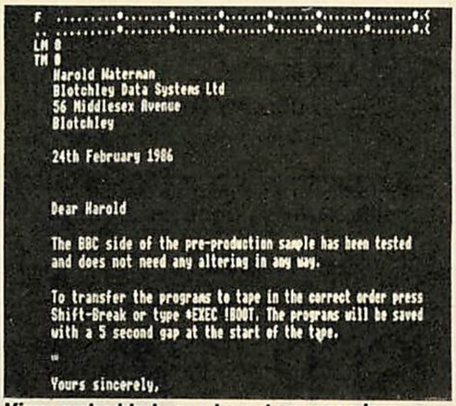
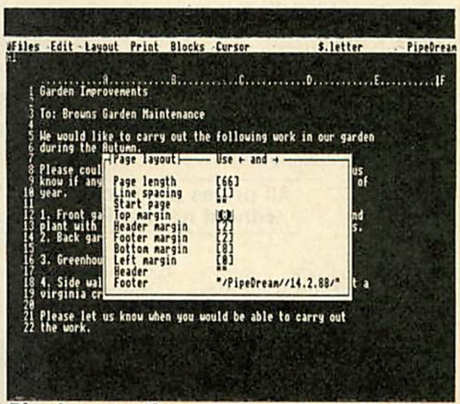


**Figure 2. Vertical page layout constructs**




***View*: embedded page layout commands**




***Pipedream*: option page controls layout**

spaces are not part of the *August* format. Also the word 'tab' has been used to mean the tab character, Ascii code 9.

To achieve horizontal rules, just type:

"¦H gutter,left,indent, right, justified, tab,tab,...$"

The ¦H is followed by four margins, separated by commas. These are all measured from the left edge of the page. The left margin is the area of the page (on the left) in which no text can ever be printed. On right-hand pages the gutter margins are on the left-hand side of the page. The indent margin is used to create 'hanging indents', so when typing in a WP, the cursor returns to the indent margin whenever Return is pressed. This margin will usually be the same as the left margin. The right margin sets the position beyond which no text can be printed. The overall line length is therefore the right margin minus the left margin.

Following the margins, and again separated by a comma, is a character indicating how the text following this ruler should be justified. The four possible characters are: L for left justified (ragged right margin) text, C for centralised (each line is individually centralised) text, R for right justified (ranged right, ranged left margin) text and F for fully justified (all lines should be made the same length by inserting extra spaces where necessary) text.

If any tabs are set, then their positions follow, preceded by their type and separated by commas. The list should be terminated by a CST. If there are no tabs, then the justification character is immediately followed by the CST. There are four types of tabs currently supported: L which is left justified, where text starts immediately at the tab; C which is centre justified, where text is centralised about the tab; R which is right justified, where text is positioned so it ends at the tab and D which is decimal, where the text contains a decimal point, then it is positioned at the tab, otherwise the text is right justified. ('spreadsheet' tab, corresponds to column position.) For example:

HO,48000,72000,840000,
L,L192000,L384000,L576000$

means a gutter margin of 0, left margin of 4, indent margin of 6 and a right margin of 70. The text in figure 1 should be left justified. There are three 'normal' tabs set at 16, 32 and 48.

To get a vertical ruler, the sequence to type is: "¦V top margin,header space,header margin,footer margin, footer space,bottom margin,page length $"]

The ¦V is followed by seven vertical margins measured from the top of the page. As usual, these are measured in 1/1000th of a point. The top margin is the distance to the top of the header, the header space is the distance to the bottom. The header margin is the distance to the top of the text, while the footer margin is the distance to the bottom.

The footer space is the distance to the top of the footer, the bottom margin is the distance to the bottom, and the page length is the distance to the bottom of the page. Look at figure 2 for an example.

To get header and footer definitions, just type "¦T text $" for headers and "¦B text $" for footers. The header is printed at the top of each page between the top margin and the header space. The footer is printed at the bottom of each page

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between the footer margin and footer space. The definitions can contain any other *August* constructs, although the only useful ones are the highlights (¦0 to ¦9), ¦F (for changing font) and ¦J (for creating three-part headers or footers). The header (or footer) is taken as *all* text between the ¦T and the CST. Thus it is possible for multi-line headers and footers to be defined (although not many WPs support this). Going even further, the header could be defined something like:

"¦T¦J text <tab> text <tab> text $
¦J text <tab> text <tab> text $$

which is a two-line, three-part header! See the section below about ¦J, the justification construct.

To specify a font, enter:
"¦F font name,point size,extra leading $"

The ¦F is followed by three parameters separated by commas, terminated by a CST. The first is the actual font name. This would usually be something like 'Helvetica' or 'TmsRmn'. This is the font that should be used as the 'base' font for subsequent text printing. If possible, various styles of this font should be available, such as italic and bold, so that highlights in the text can be reproduced. Following the font name is the point size. For normal text as printed by a WP, such as *View* on a dot-matrix printer, this would be 12000 (six characters per inch, 72 points per inch = 12 point). The final parameter is the extra leading. This is the extra blank space printed below each letter. Books often say on one of the first pages 'printed 10 on 12 point'. This means that the text is 10 point, but it is printed with a line spacing of 12 point. In this case the extra leading is two points. This can be used to specify the line spacing of a piece of text. Double spaced text would be indicated by "¦F name,12000,12000$"

The construct "¦E expr $" allows spreadsheets to be transferred as well as WP files. The expression should be an Ascii formula terminated by a CST. Spreadsheets should be stored 'horizontally' with each ¦E construct separated by a tab (Ascii 9). Two special ¦E expressions are defined, these are: "¦E xx.xx.xx $" which indicates a date and "¦E xx:xx:xx$ " which indicates a time.

The "¦J left <tab> centre <tab> right $" construct is used to justify individual lines. Normally, a paragraph will be formatted according to the justification-type byte set in the horizontal ruler definition. If, however, one line needs a different type of formatting, it should be stored within the ¦J construct. There are three elements to the construct separated by tab characters (Ascii 9) and terminated by a CST. The first one is the 'left' text, this will be positioned with its first character on the left margin. The second element will be centralised on the line, and the final element will be right justified. Elements need not be present, but both tabs and the CST must. It is allowable to put further *August* constructs within the elements, although as with headers and footers, the only useful ones would be ¦F and ¦0 to ¦9. For example, "¦J Chapter 1 <tab> <tab> Introduction" would left justify 'Chapter 1' and right justify 'Introduction'. This construct is ideal for setting up three-part headers and footers that are used by a large number of WPs.

The ¦J construct forms a separate line and would normally be preceded by a carriage return. Text following the CST of the ¦J will start on the next line.



***First Word Plus*: can't read *View* files**

"¦P 'n' $" informs the formatter of the destination WP not to split the following 'n' lines across a page break. For an unconditional break, like forcing a page break immediately, then 'n' should have a value of 0. This construct is used to prevent the splitting of tables or figures.

Data specific to a few applications can also be transferred using the *August* format by using the "¦? application name, data $" construct. Thus all data in a file is at least retained in the *August* format file. If another application 'knows' about this type of data, then the converter to that application can be made to recognise it and translate it as necessary. This is a bit of a cop out as it means that *August* is not totally universal, but for the sake of not overcomplicating the format, this method offers a quick way out!

The ¦? construct has two elements separated by a comma and terminated by a CST as usual. The first element is the name of the application from which the construct came. The list of existing applications is: *View, ViewSheet, ViewStore, Wordwise, Pipedream* and *First Word Plus.*

The second element (following the comma) is the data. This can contain any characters, although it is advisable to keep away from 'control characters' (Ascii values less than 32) so as to keep the *August* file Ascii-readable. This data is totally format free. The only slight restriction is if you need to put an '$' in the data, then you'll need to precede it by an '¦', (see the section below on 'special characters').

There are 10 highlights currently defined. The full list can be seen on page 75. They are turned on by putting the appropriate pair of characters into the file. This code should be repeated to switch them off again. None of the codes automatically switch off at the end of lines (as text is now a continuous block and may be reformatted).

The two literal sequences are needed to prevent an *August* converter from getting confused as to what CSIs and CSTs are and what real '¦'s and '$'s are. The ¦# construct is used to mean 'the current page number'. Many documents create headers or footers that contain the page number somewhere in them, so a standard method of retaining this is needed. ¦# can be placed freely within the main text, a header/footer or a justified line.

As an example of the versatility of *August*, and also to demonstrate nested constructs, the following sequence: ¦T¦J Chapter 1 <tab> August Definition <tab> Acorn User $ ¦J Page ¦P <tab> <tab> November 1988 $$ would define a two-line header that would be displayed as:

Chapter 1 August Definition Acorn User
Page 5 November 1988.

You must of course remember to set up a vertical ruler with a suitable top margin and header space to allow for the two lines.

That completes the definition of the *August* standard. Next month's issue will contain converter programs for *View, Pipedream and First Word Plus.* In the meantime, I'd be interested to hear any comments on this standard, ideas for enhancing it without over-complicating it and converters for other WPs or, in deed, any other applications.

*The ideas behind UNCOL, and the original proposal can be found in the August and September 1958 issues of the Communications of the ACN. The paper was entitled:* The problem of programming communication with changing machines: a proposed solution *and was written by J Strong, J Wegstein, A Tritter, J Olsztyn, O Mock and T Steel.*

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# L I

**Two or three dimensional evolution of cell patterns can be interesting to watch on a screen. But what of the one-dimensional variety?**

***Susan Stepney***



ILLUSTRATION BY MICKEY FINN

You are all probably familiar with John Conway's game of *Life* – from the pages of this magazine if not elsewhere. It is an incredibly simple idea: 'cells' are placed on the screen and 'evolution' takes place with the future of each cell governed solely by its neighbours. A good, fast implementation is fun to watch – one such implementation was presented in May 1988's Agora column. An obvious extension to Conway's original is *3D Life*, which was covered in *Acorn User*, in March 1984.

But there's another possible variation: One-Dimensional *Life*, where a single generation takes up just one line of the screen. The first generation is displayed at the top of the screen, the second generation on the line below, and so on until a whole pattern of evolution is built up.

*1D Life*, or to be more technical, one-dimensional cellular automata, starts off as a line of cells. Each cell can have one of several values or states. In Conway's original *Life*, cells just have two states: on and off. The future of each cell is determined by the states of nearby cells.

Just how far a cell's influence stretches depends on the 'neighbourhood'. More precisely, if N is the neighbourhood, the state of cell 'i' at time 't' is determined by the states of cells i+N to i–N at time t–1.

In Conway's *Life*, N=1: only next-door neighbours affect a cell's future, but there are rules which govern the state of a cell in the next generation and these are defined in terms of the current states of other cells.



**Life history of a single cell**

In Conway's *Life* the rules are fixed: the game is to find different cell patterns that evolve in interesting ways.

In *1D Life*, different rules give rise to wildly different results: the game is to find interesting rules.

So, how many different possible rules are there? Consider the simplest interesting automaton where S=2 (just two states) and N=1 (the smallest interesting neighbourhood in where only next-door neighbours matter). Here, only the cell itself and its two immediate neighbours affect its future. There are only eight possible initial states: 111, 110, 101, 100, 011, 010, 001, and 000.

In general, for an automaton with S states and a neighbourhood of N, there are S∧(2N+1) possible initial states. Consider these to be base-S numbers, and write them out in decreasing order. Underneath each one write the resulting state as a digital in base-S. You get an S∧(2N+1) digit number in base-S – the rule number. Table 1

# F E

shows a couple of examples. The rule number for the first is 00011110 in binary, or 30 in decimal. The second has rule number 01111110, or 126.

Every choice of final state for each of these different initial states is described by a different rule. In base S, there are S∧N different N-digit numbers, and this means there are S∧ (S∧ (2N+1)) different possible rules. For our simple automaton (with S=2, N=1) this gives 256 different rules. That doesn't look too bad, but just increasing S to 3 gives 3∧ (3∧ 3) or about eight trillion different rules, so there's plenty of scope for exploration!

An easy way to cut down the number of rules considered is to use only those where the final state depends on the sum of the values of the initial states. Table 2 contains an example of such a rule. There are only four possible sums and, for each, there is an end-state defined. These end-states form the rule. For example, consider a cell with a neighbour on either side. Using the rule in table 2, the initial state is 111, the sum is 3, and so the state of the cell in the next generation will be 0.

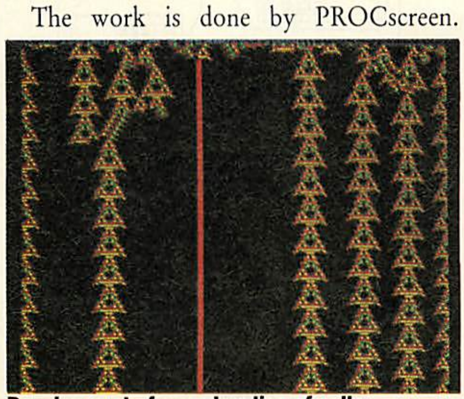
The rule in table 2 is 0110 and this is known as the totalistic code. The rules in Conway's original *Life* are, in effect, totalistic – the life or death of a cell depends only on the number of neighbours and not their positions. Table 3 shows how many totalistic codes exist for various values of S and N.

Listing 1 on the yellow pages calculates the automaton described by a totalistic code. It fills the screen, with each generation making up a line, and then waits for you to press any key. Add a 'save screen' option at line 125 if you want.

Listing 1 was written to run on a standard BBC in modes 0, 1 or 2, but works about eight times as fast on an Arc. If you want to use one of the Arc's higher resolution modes, change lines 170-190 where the resolution is set up. The number of distinct cells across the screen is stored as m% and the number of lines down the screen is stored as line% (160 and 256 respectively in screen mode 2).

There are three main variables: the number of states per cell (s%), the size of the neighbourhood (n%) and the rule (rule$). PROCparams requests these values and then asks for an initial pattern. You can either enter your own, or press Return for a random one.

The work is done by PROCscreen.



**Development of a random line of cells**

There are two arrays, a% and b%. The current generation is stored at a% and is plotted out as a line of dots, different states being shown as different colours. The new generation is calculated and stored at b%. After displaying a generation, a% and b% are swapped over so that the current generation becomes the last.

What happens at the edges of the screen? Listing 1 employs a common solution, using 'periodic boundary conditions'. This is a way of wrapping the line round into a circle, so what falls off one edge reappears at the other.

Lines 320-450 of listing 1 deal with this. It's not really necessary to do the ends separately, but the MOD function is quite slow, and is only needed at the ends. By



making a special case of the ends in this way, the program's speed was improved by 30 per cent.

To change the program to accept a rule number, rather than totalistic code, you just have to change the following lines:

```
540 index%=index%*s%+?
(a%+i%+k%)
change lines 430 and 440 similarly

720 dim%=s%^(2*n%+1)
```

Table 4 contains the values used to produce the pictures on these pages. Figure 1a shows the development of a single cell; the other examples pictured used random starting conditions.

It's probably better at the start to restrict yourself to either a small neighbourhood with a large number of states or vice-versa. That way, there may be few enough rules for a systematic exploration.

Rules fall broadly into four groups: those which give 'instant death'; simple periodic structures; continuously growing structures, and chaos! Since random starting conditions give a different picture each time, it is probably worth trying a few different starts. I usually define a function key with values for N, S and R, to make experimentation easier.

| Initial state | 111 | 110 | 101 | 100 | 011 | 010 | 001 | 000 |
|---|---|---|---|---|---|---|---|---|
| Rule a | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |
| Rule b | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |

**Table 1. Simple rules**

| Initial state | 111 | 110 | 101 | 100 | 011 | 010 | 001 | 000 |
|---|---|---|---|---|---|---|---|---|
| Sum | 3 | 2 | 2 | 1 | 2 | 1 | 1 | 0 |
| | | | | | | | | |
| Possible sums | 3 | 2 | 1 | 0 | | | | |
| Rule | 0 | 1 | 1 | 0 | | | | |

**Table 2. Sum rules**

| N | S | Possible rules | Possible codes |
|---|---|---|---|
| 1 | 2 | 256 | 16 |
| 1 | 3 | 8x1012 | 2187 |
| 2 | 8 | 1030 | 3x1032 |

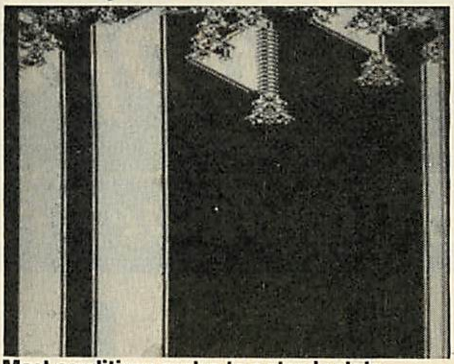
**Table 3. Totalistic codes**

| N | S | Totalistic codes | |
|---|---|---|---|
| 1 | 2 | 110 | figure 1 |
| 1 | 3 | 1002100 | figure 2 |
| 2 | 2 | 110100 | figure 3 |

**Table 4. Examples**

At the moment, the program does only one screenful and then stops – you can only see 256 lines. To look at long-term behaviour, you might want to make the screen scroll.

If you are going to do a lot of work on one particular size neighbourhood, it's well worth producing a hardwired version with the k% loop replaced by a direct sum. This improvement can speed the program up by about 30 per cent.



**Most conditions evolve to a steady state**

Another possible enhancement is to make the new state at time (t) depend not only on states at t-1, but also at t-2. In other words, make history matter more.

It has been proved that Conway's *Life* is computationally irreducible. That means, given an arbitrary starting pattern, there is no way of working out what the result will be – total death, steady state or infinite growth – without following each evolutionary step. There are no short cuts: the quickest way of finding the answer is to watch it evolve. It's probably the case that some of the 1D rules also give computationally irreducible automata, but this has yet to be proved.

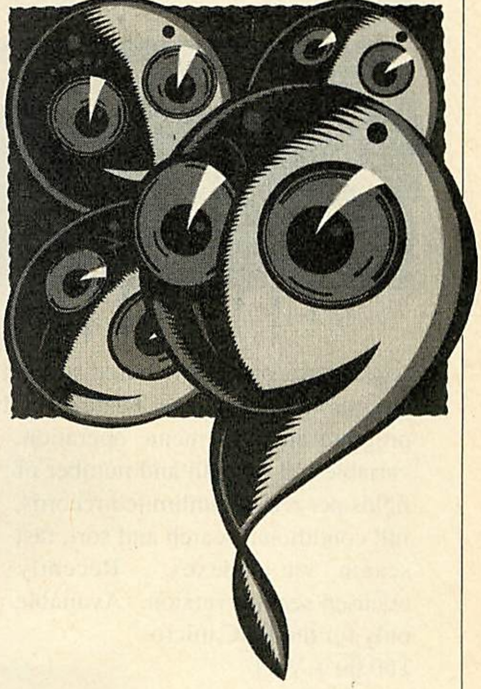
This is quite a remarkable result – it shows that a simple set of rules can lead to fundamentally complicated behaviour. It's only recently, with the help of computers, that we've begun to understand how the very simple rules of physics can be compatible with the complicated Universe that exists around us.

Tommaso Toffoli and Norman Margolus *Cellular Automata Machines: a new environment for modelling* (MIT Press, 1987) is a good book about cellular automata in general (not just in 1D), showing how they can be used to model real physical systems.

Stephen Wolfram introduced 1D cellular automata to the world in general. Two of his papers are worth getting hold of: the titles are given below. Both are highly technical but he does include a lot of interesting rules (although, perversely, he often gives them in base 10!)

S Wolfram (1984) *Cellular Automata as Models of Complexity*, Nature, vol 311, pp 419-424.

S. Wolfram (1985) *Statistical Mechanics of Cellular Automata*, Reviews of Modern Physics, vol 55(3), pp 601-644.



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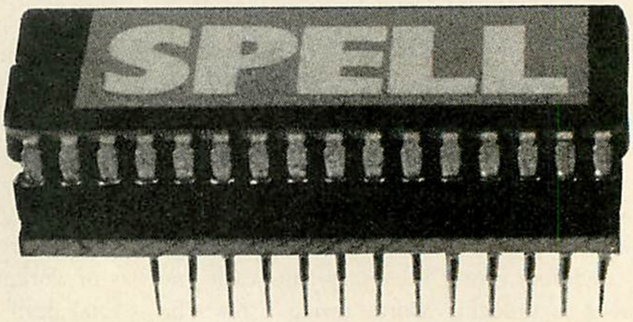
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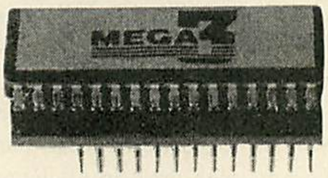
### SPELL-MASTER




A 128K spelling checker on ROM, with a 57,000 word dictionary (and user dictionaries can be added). Check-as-you-type or check entire document in Wordwise, Inter-Word or View. Features include dictionary browsing, crossword and anagram solving, and fuzzy checking. BBC, Archimedes and Z88 versions:

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A full WYSIWYG word processor, including ruler controlled margins and tabs, simultaneous on-screen display of printer highlights, text alignment, page breaks etc, multi column printing, multi file operation, 40/80/120 column screen modes.

### INTER-CHART

INTER-CHART. A comprehensive chart and graph plotting program to handle bar graphs, pie charts and line graphs, which can be overlaid or printed in any combination, with auto or manual scaling.

### INTER-SHEET

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**Products bought direct from Computer Concepts carry a money back guarantee. Why not try them out, and see what seven years of development on the BBC can achieve?.**

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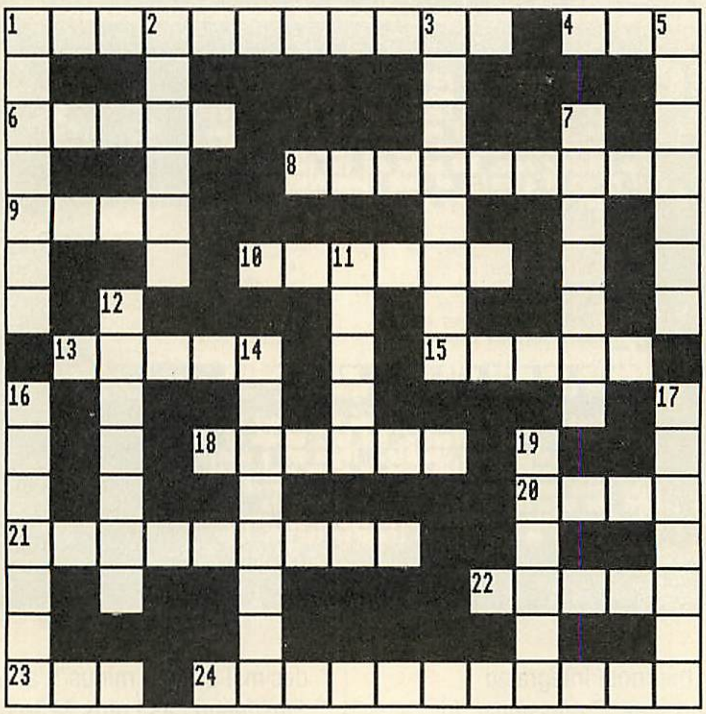
**Gaddesden Place, Hemel Hempstead, Herts, HP2 6EX. 0442-63933**

# COMPETITION

# PIT YOUR WITS

**Three lucky winners will receive one of Acorn User's own wide-carriage printers if they can solve our crossword puzzle. So come on, have a go**

***David Lawton and James Niesewand***




**Across:**

1 The Immune Cat Co assembles to make contact.
4 How did the RAC get mixed up with this machine?
6 Ponder about a duck or a rodent with buttons.
8 A seed, a journalist and a box of paper is all you need to make a wordprocessor.
9 Basic keyword in Diourbel, Senegal.
10 Adhere, perhaps, to top of printed document.
13 Disc mechanism made from galvanised rivets.
15 Undid knot around eastern keyword abbreviation.
18 Almost breezy about one's curves.
20 Part of the old block.
21 Project follows advert for game.
22 Unlit mishap terminates the loop.
23 Force it into memory.
24 Sort of software to make Titanic veer!

**Down:**

1 2000 points in bed! A useful reminder when programming.
2 Computer found in meandering stream.
3 IT's distant writing.
5 Ammunition returned in CND order.
7 Oriental group returns, follows Del and removes a file.
11 Sounds like Arthur's a character!
12 Sound's like Noah's residence and a bee's home are used to store data.
14 What the US voters did to make this little computer.
16 Flight simulator came, initially, from air vehicles Ian and Ted overhauled recently.
17 OS that is mixed with stewed plums.
19 Alien runs around part of eye network.

Wordsmiths – you can win a super wide-carriage printer!

If you have a devious turn of mind, and you fancy a chance to win one of three *Acorn User* printers, then why not have a go at this crossword.

The printers are Epson FX-compatible, they come with a parallel printer cable and a manual. Being 132 columns wide, they are ideal for printing out those massive spreadsheets.

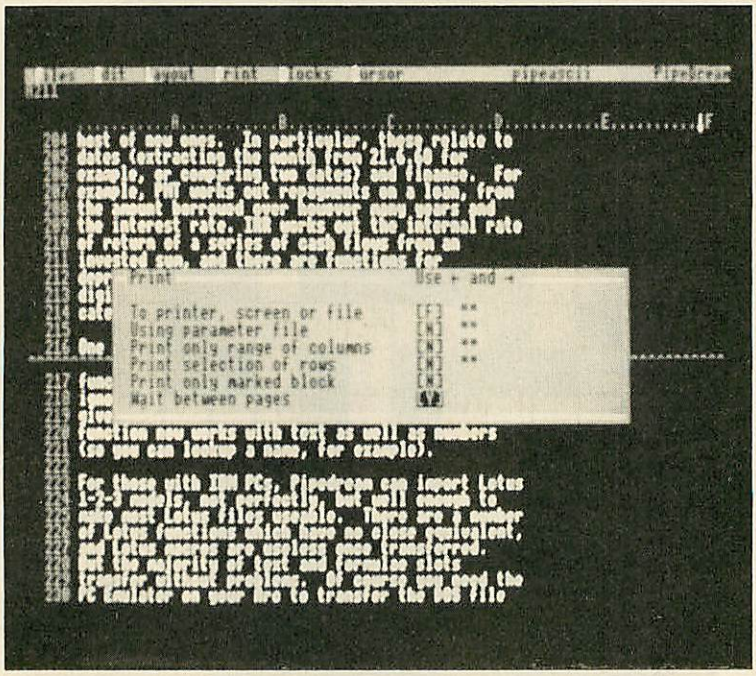
The winners will be the first three correct solutions out of the hat on December 6. Either list your words on the back of a postcard, or photocopy the crossword grid and fill it in clearly. Remember to include your name and address so we can let you know if you're one of the winners, and include the coupon below too.

ACORN USER
COMPETITION
NOVEMBER

# OFFERS

## PIPEDREAM

# Power to your fingertips




*Acorn User* readers can now buy the most integrated software packages, *Pipedream* and *View Professional*, for only £99 and £65 all inclusive.

*View Professional* works on the BBC model B and the Master series. *Pipedream* is available for the Archimedes, the Master 512, the IBM PC and compatibles.

Features:

* load file, insert file, load row selection
* save file, save column range, save row selection
* load/save several spreadsheet formats
* up to 8192 columns, 536870912 rows
* sort in ascending or descending order alphabetically, numerically or chronologically.
* linking files to pass numbers between documents
* user-defined colour displays
* foreign character editing and printing
* copy, move and delete blocks
* save cursor position, go to old cursor position
* redefinable keys
* swap case
* force page break
* multi-file documents
* print mail shots
* flexible printer drives, microspacing, foreign characters
* leading and trailing characters
* English/American date formats
* decimal places, minus/brackets
* *Pipedream* has Lotus 123-compatibility
* Wysiwyg display

'For business reports with a mixture of numbers and text, you can't beat it. . . *Pipedream* is almost indispensible'. *Acorn User*, October 1988.

Please send me ______________ Pipedream packs at £99
My computer is ______________
Please tick MS-DOS 5.25-inch disc ☐ MS-DOS 3.5-inch disc ☐ Archimedes 3.5-inch disc ☐.
or send me ______________ View Professional packs at £65
I enclose my cheque/postal order for £ ______________ made payable to Colton Software.

Please charge my Access/Barclaycard
ACC NO ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐
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NAME ______________
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Send this coupon with your remittance to *Pipedream Offer, Acorn User* **Merchandising, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ.**

# FROM BOOM TO BUST

**Continuing our story of Acorn – how it rose to the dizzy heights and how it came down to earth**

**Carol Atack**




**The Acorn Business Computer – never recouped the expenditure invested in its development**

Acorn's first few years were ones of wild growth and expansion. The demand for computers had exploded in a way unimaginable in 1980 – the days of soldering mail order kits together. The BBC micro had ridden this wave of sudden enthusiasm, taking the company with it. Not only was it backed by the BBC's Computer Literacy Project, but from 1982 the Goverment's Micros in Schools scheme ensured that Acorn dominated the newly opened education market. Micros in Schools was the brainchild of the present education secretary, Kenneth Baker: it subsidised the purchase by schools of BBC micros, Sinclair Spectrums or Research Machines' 3802. Of these approved machines, the Beeb was by far the most popular. Sales in the Christmas 1983 period were double those of 1982. Would the boom continue or would home computers become a passing fad like skateboards or hula-hoops?

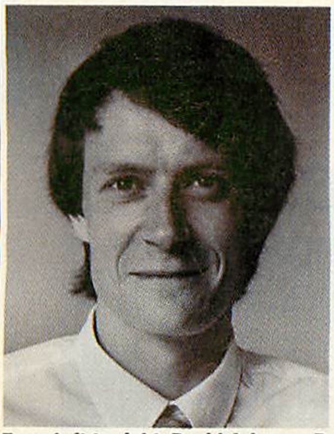
Acorn's directors firmly believed that growth would continue, and the launch of the company on the Unlisted Securities Market suggested that City economists supported that view. However there were signs that the type of computer in demand would change. Chris Curry's pet project, the Electron, was designed to cater for less sophisticated late-comers to the computer market. It was launched in August 1983, timed for the Christmas rush and priced at £199. However it was late, dogged by production problems particularly with the large custom designed chip at the Electron's heart. Acorn failed to meet the demand for the new machine in much the same way as it had with the BBC micro.

The Electron was unpopular with Acorn's design boffins, who saw it as a threat to the company's commitment to developing machines at the forefront of technology. They busied themselves with more technically interesting projects such as finding more and more arcane second processors to attach to the Tube, and developing Hermann Hauser's office automation dream.

At the beginning of 1984, Acorn was determined to be able to satisfy the demand for its micros – something it had failed to do in the previous year. The failure had been caused by several factors, most notable among them a shortage of crucial components. Actual production of the computers was handled by subcontractors, so the volume of machines which could be produced was limited by their schedules and there was little flexibility to increase or reduce levels. This would become critical over the next year.

Contracts for supply of components and production of machines had to be decided and agreed well in advance. So by April, Acorn's directors had already decided that this was to be another year of unbridled expansion. Large retailers showed an interest in stocking the machines, and initially prospects for the Christmas ahead seemed good. But by the autumn, it was clear public demand and enthusiasm was on the wane. While Acorn was locked into producing vast numbers of Electrons, the chain stores were developing cold feet and failing to confirm the orders and quantities they had been discussing.

Despite an extensive £4-million advertising campaign, a third of the Electrons that were built never made it on to Santa's






**From left to right; David Johnson-Davies, Elserino Piol, Dr Alex Reid and Brian Long – all played important roles in Acorn**

sleigh – and behind them, there were large stockpiles of components that had been paid for, but remained unused.

The US division set up that year had been intended to win Acorn a share of the vast American education market. But this also failed to contribute any profits. By the time Acorn closed its American subsidiary it had cost it over £2 million.

The business machines with which Hauser and Acorn had been hoping to reach new market areas likewise failed to take off. The Acorn Business Computer, launched in 1984, was a large and unwieldy device. The original idea was for it to contain a BBC micro and a Z80 second processor, to run the then standard CP/M operating system. But CP/M had already lost ground to the MS-DOS standard set by the IBM PC. Another planned version used an Intel 80286 – ideal for competing with IBM PCs but this never appeared. In fact, the only ABC model to achieve even limited success was the Cambridge workstation, featuring a fast 32016 second processor instead of the Z80, and aimed at the further education and research market. The machine certainly never recouped the huge resources expended on its development.

What was more critical to the company's success was the upgrading or replacement of the BBC micro. Acorn's commitment to research and development was undeniable; at one point its hundred or so development staff were working on around 140 projects. While some of these projects eventually emerged as useful and marketable products, much effort was expended on work with no obvious application. Several efforts were made to rein in this side of Acorn, in parallel with attempts to give the company a more conventional and coherent management structure. However, very often, priorities were muddled.

Microsystems manager David Bell recalls his frustration at seeing resources diverted away from the project he was managing at this time, the BBC Master, in favour of the stopgap model B+.

The B+ was clear to all as a model B with a new sticker on the front. The changes involved in the B+ were aimed mainly at reducing the cost of manufacturing – and hardly merited the title of 'new product'. But the Master, eventually launched in early 1986, was the true replacement and to this day continues to be a successful product for the company, and a well thought-out machine for its mainly educational users.

The most advanced division of the Advanced Research and Development section was, during 1984, working on a new processor chip incorporating the idea of a reduced instruction set – an idea that was at that time quite revolutionary.

Even within Acorn few people knew about the project – it took Roger Wilson some time to tell his boss, Hauser, what he was doing, let alone anyone else. Other projects that were under development at that time concentrated on telecommunications, interfacing computers with them and interactive video.

While the depth and number of research projects showed that Acorn had a long-term, if hazy, commitment to the future, its parlous state at the end of the disastrous Christmas 1984 sales period did not inspire similar confidence. Investors, the press and Acorn's creditors on the production side were all worried. Newspaper articles, most notoriously those in the *Sunday Times*, suggested that all was not well. The share price, buoyant through most of 1984 fell rapidly from its peak which had valued the firm at over £190m. Eventually, in February, one creditor issued a winding-up petition. Acorn had fallen out with one potential source of help – its merchant bankers Lazards, and receivership seemed only too likely. Instead the company's new bankers searched for another company which could take on Acorn and help it through its crisis.

The Italian computer giant Olivetti stepped in after brief but intense negotiations. On February 20, 1985 (at 2.30 in the morning to be precise, reported *Acorn User* at the time), Curry and Hauser signed an agreement which gave Olivetti a 49 per cent stake in the company for £12 million. The money would go some way to covering Acorn's £11 million losses in the previous six months.

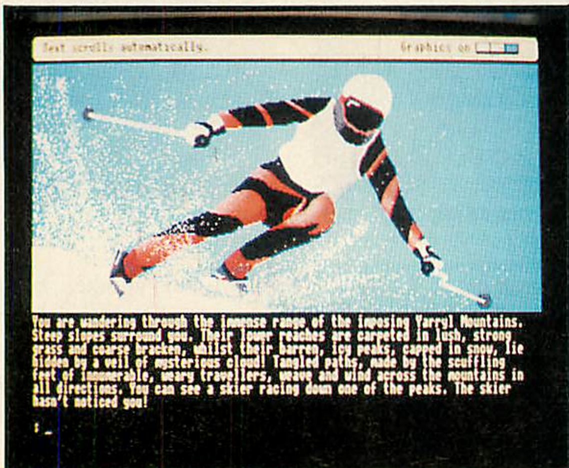
Tales abound of Acorn's optimism and profligacy – it bought 10,000 music add-ons for its computers. They occupied valuable warehouse space for years until recently being resold to the original supplier for a much smaller sum of money. Manuals were lovingly produced in Acorn style for CP/M software for the business machines. The aeroplane and the racing cars disappeared quickly.

Other changes were to be made to the company, a new structure, a new board including members from Olivetti and AT&T (Olivetti's large American shareholder) and 120 fewer staff – a quarter of the previous total. And it was only after the Olivetti take-over that proper emphasis was put on the real replacement for the BBC model B – the Master.

However great the sums handed over, they soon proved to be insufficient. During 1985 it became clear that the sales targets set by Olivetti were not being reached. A further cash injection increased Olivetti's share of Acorn to 80 per cent and a new managing director, Brian Long, was installed. It was at this stage that the first rumours of the reduced instruction-set chip began to emerge – amazingly Olivetti had taken over Acorn without knowing about the company's most promising long-term project. Roger Wilson says, 'After Olivetti arrived we said to them, "Now

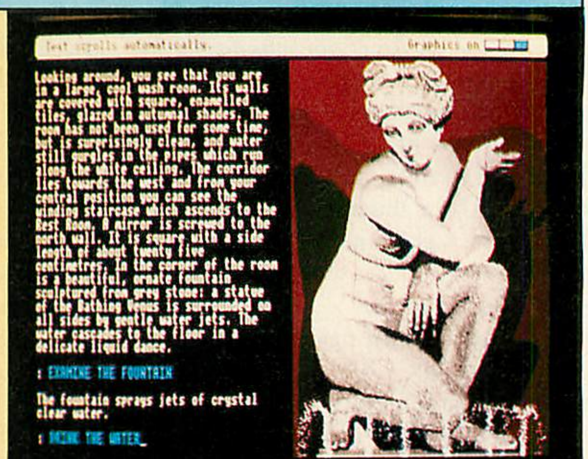
# ENTHAR SEVEN

## Now For The Archimedes



Enthar Seven is a brilliant science fiction adventure for the Acorn Archimedes. It has 450 locations, 80 objects, an extensive vocabulary and over 140K of text - enough for a small novel! Several locations are illustrated with breath-taking, full colour pictures which enhance the atmosphere of the game and show just what your super-computer is really capable of! This game is a must for your Arc software collection!

Enthar Seven, when it was released on the BBC, achieved unrivalled critical acclaim. It was voted Best Overall Adventure in A & B Computing and Computer + Video Games were ecstatic over the game: **"Enthar Seven is an absolute knock out! We couldn't have given it more marks if we tried! Cassette owners go out and buy a disc drive. Disc owners read on then buy the game! Personal Rating: 10 doesn't start to say it!"**





Enthar Seven is available NOW on the Archimedes on 800K disc with full colour graphics. A 130K Mode 7 version without graphics is available for the BBC B / B+ / MASTER and a 130K Mode 6 version also without graphics is available for the Acorn Electron with DFS compatible disc interface.

You can order by telephone using your ACCESS card, or by cutting out the coupon below. All orders are despatched first class by return.

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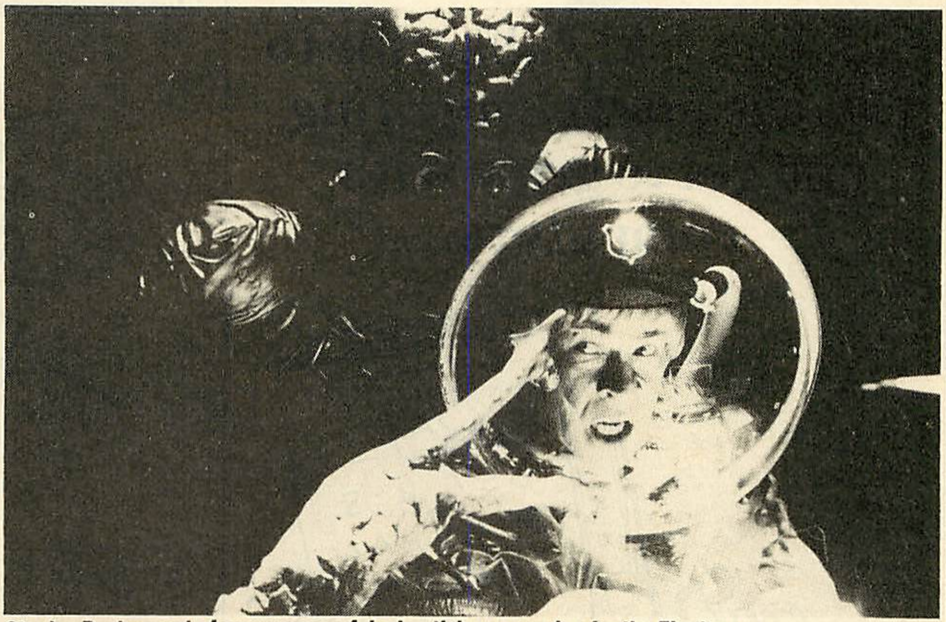
you've bought the company, we can tell you what we are really working on".'

The Master series was launched at the beginning of 1986. It seemed to some observers an anomaly, an 8-bit machine when all except the cheapest home computers were turning to the 16-bit MS-DOS formula imposed by the success of the IBM PC. As a refinement of the original BBC machine it had a lot to offer, with convenient bumps and holes to house the beloved add-on bits and pieces of the BBC world. And because of the use of custom chips and more modern components, it was cheaper to manufacture than the original model B had become. However at £499 for the basic model, it was relatively expensive, and outside Acorn's stronghold in the education market it could never hope to achieve the sales of the original BBC micro. A concession to industry standards was offered by the Master 512 – which gave a measure of PC-compatibility, but at a price close to £1000.

With its own 32-bit chip looking very good during development, it is clear that Acorn saw no need to forsake the trusty 6502 chip which ran its computers at more than acceptable speeds. Why bother to give that up in favour of a 16-bit standard that could only be a stopgap? But even if you dispute their validity, compatibility with prevailing industry standards offers at least the safety of numbers, and following its own path would prove a risky business for Acorn. In an industry which expects everything to get better and faster on an annual basis, Acorn seemed for a time to be refusing to compete. Its new product, announced in September 1986, the Master Compact, offered little new except its exterior design packaged into three boxes rather than the customary two. Even this was a stopgap – an engineering necessity born out of the need for a 'new product now' – the Compact cases were originally designed for the Acorn Communicator, an ill-fated product which sold in low numbers to companies needing computers with built-in modems.

The RISC chip, while new and exciting and very, very fast, had not yet taken the form of a tangible machine which could be sold to customers. Luckily, the continued good sales of Masters kept the company afloat while the Advanced Research and Development team under Roger Wilson and Steve Furber developed the ARM chip and its companions that eventually became the Archimedes.

*Continued next month*



**Stanley Baxter; part of an unsuccessful advertising campaign for the Electron**

**A RISKY BUSINESS**

*1977* Sinclair launches MK14

*1978* Chris Curry leaves Sinclair to set up CPU with Hermann Hauser

*1979* Acorn Computers is formed with premises at Market Hill, Cambridge. System 1 is launched

*1980* Acorn launches the Atom. Acorn forms Acornsoft with David Johnson-Davies as managing director. Richard Russell at BBC does specification for micro to accompany TV series. Econet is launched on System machines. BBC sees Proton design

*1981* BBC deal is signed for 12,000 BBC micros. BBC TV launches *The Computer Programme*

*1982* PCW features 'Anatomy of the BBC micro'. Same issue announces Electron and $2000-Acorn micro is running with National Semi-conductor 16032 chip. *Acorn User* is sent free to owners of BBC micros. Advertisers included Computer Concepts with *Wordwise*, Beebug, and CJE Micros. Acornsoft launches *Defender* and *Snapper*. 25,000 BBC micros are shipped. *View* is announced. BBC TV's *Making the Most of the Micro* series begins

*1983* Acorn launches BBC micro in USA. Electron is launched. 100,000 BBC micros are shipped

*1984* Year end: £4.5m promotional campaign in a bid to win sales of 300,000 Electrons and BBC micros and £2.5m in software by Jan '85. Acorn announces plans to extend product range in *FT*, and reduces dependence on home computer business. *Elite* comes from Acornsoft. In 6 months £55m turnover, £11m loss, after taking into account £7m provision for loss of value of stock and £2m trading loss in US and Germany

*1985* Acorn press statement talks of 'orchestrated campaign' and 'vendetta' in the press, especially in the *Sunday Times*. Acorn shares are suspended. Olivetti refinancing. It pays £10.4 for 49% of Acorn. Losses announced: arise from US (and Germany), and shortfall in Electron sales over Christmas. First ARM samples are operational. Cambridge Workstation based on 32016 is released Year end: £78m turnover, £6m loss. Brian Long is appointed MD and Alessandro Uboldi replaces Hermann Hauser. Second Olivetti financing is announced. Creditors write off almost £8m. Olivetti raises Acorn holding to 79.8% at cost of £4m. 400,000+ BBC micro owners. ARM and 128k BBC model B is announced

*1986* Master series is launched at BBC's Langham Gallery, Master Compact follows

*1987* Bruno Soggiu is appointed chairman, Brian Long resigns

*1988* Harvey Coleman is appointed new MD

# LAPPING IT UP

**Does an A4-sized computer have what it takes to revolutionise the education system? We take a closer look**

*Chris Drage and Nick Evans*

The Z88 may seem to be a strange theme for an article in an Acorn-dedicated magazine, yet this newcomer to the laptop market has a huge amount to offer all Acorn users, particularly those in education. This article is an overview of some of the facilities offered by the Z88. It evaluates its potential, not only as a computer for teachers to use but, more importantly, as a universal keyboard in the satchel of every secondary school child.



**Z88: cheap, compact and portable**

The Z88 is a computer the size of an A4 paper pad, with a built-in LCD screen which displays text 80 characters across by six lines down. It has a dedicated set of application software, incorporating wordprocessing, spreadsheet and database facilities as well as the normal desktop tools. A comprehensive Help facility provides you with an inbuilt guide to the operation of most aspects of the machine's use. The Z88 is powered by either four penlight batteries or a mains adaptor. Its resident memory is expandable from the basic 32k up to 15 megabytes using slot-in RAM packs. There are facilities for storing information or applications more permanently, on both EPROM and ROM packs. The machine's lines of communication with the outside world include a serial port similar to that on the Archimedes. Using this port, all operations such as printing, communications and file transfer may be undertaken. There is also a PCB edge connector which will be used for further devices.

Since the whole intention of the Z88 is to provide a dedicated set of tools, there is one program which provides all the facilities apart from computer management and desktop tools. *Pipedream* is a package which is now available on the Archimedes (see review by Graham Bell, *Acorn User* Oct '88). Its facilities include wordprocessing, spreadsheet and database, an all-in-one package. Since the software is very *View*-like, new users will have little difficulty, especially if they are also familiar with a spreadsheet. The power of the package lies in the fact that it can handle normal wordprocessing with the features of spreadsheet and database included. So, for example, documents that might previously have been built up by importing output from *ViewSheet* and *ViewStore* into *View* may now contain 'live' information, removing the need to import. As an example, the music teacher's records in the box show a main file which charts the progress of pupils and their instruments, while the abstract (which was created within the same document) gives a specific print-out of the required data. Moreover, since the data is 'live', it can be modified dynamically. For instance, if the pass grade necessary for a distinction rises from 130 to 135, a simple editing procedure modifies all related data in the document. This would have been complex to create using normal business tools, but in *Pipedream* the task is relatively simple and, with practice, becomes a matter of routine.

Since software can be stored in RAM, EPROM or ROM, and data collected may be put into the RAM or EPROM and then transferred to other machines later, the Z88 also provides a powerful tool for field study work.

The beauty of the whole system, as far as BBC, Archimedes and IBM PC users are concerned, is that files created on the Z88 may be transferred to the desktop micro. In fact the operation is exactly the same as loading the information in from a disc. You must connect the two micros via an RS232 cable and run the *Link* software on the Z88. In *Pipedream* on the Archimedes or IBM PC you select the Load option from the pulldown menu, enter 'Z88:' and then examine the contents of the Z88's memory as if it were a disc catalogue. When you select the relevant file, the system loads it in, ready for use. The process of saving files to the Z88 is exactly the same, except that the Save command is used. This powerful facility eliminates all the hassle of transferring files between computers.

Professor Tom Stonier of the University of Bradford has long maintained that the computer is the single most powerful educational tool that can be given to any child. Seymour Papert, creator of Logo, also maintains that every child should be given access to the most powerful computers available, even at the start of their education. The advent of the Z88 means that the

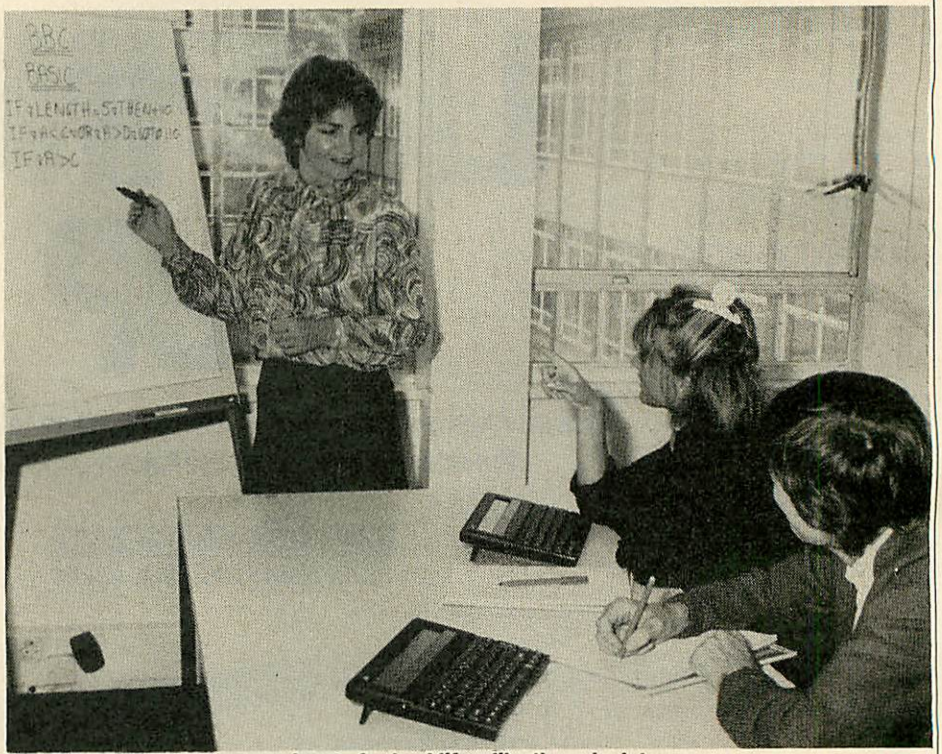
idea of a computer for every child may no longer be that far-fetched.

If the day does arrive where all school children have computers, there would obviously be many advantages. All the children would have access to wordprocessing and calculation facilities, as well as other tools. Communication with local and remote databases of information would become a reality; mass distribution of information to pupils for administrative and educational purposes would become possible; and the lack of keyboards which is the main reason for the non-development of information technology in schools would be remedied in one fell swoop.

The benefits of wordprocessing, probably the most significant computer-centred activity in schools, need no proposition here: it is a well-established fact that the power of drafting with a wordprocessor not only enhances the fluency of a child's writing but also enables them to express their ideas more directly and clearly. If you add to that the ability to handle figures in spreadsheet form, you realise that here are two of the main educational 'skills'. The Z88 serves both well.

Teachers, as well as children, will benefit from the introduction of a do-it-all machine. Again, the question of accessibility is the one that has limited teachers' use of the computer. The staffroom machine has made many converts who have since been disappointed by lack of equipment. With readily available equipment of a standard type which will communicate easily with other machines in the school, the teacher has access to a powerful tool for the creation, storage, analysis and output of all the documentary work that is involved in their professional life. With standard 'templates' (structures ready-prepared for data that may be loaded into computer applications), all teachers could have access to a standard format for the collection, storage and analysis of marks, attendance, examination entry and so on.

A further interesting possiblity for the Z88 is the personalised timetable/classlist/holiday planner or whatever. With timetables, etc, becoming increasingly organised by computer, the ability to distribute information in a form personalised to each teacher and child would save time, printing costs and confusion. The simplest method would be to send all data relating to groups and their timetables to each machine. At the same time a program in the machines would abstract from the data those pieces of information relevant to them. The remaining irrelevant data would then be destroyed and the memory space retrieved. In this way, each child would have access to information about their school day, week and year at the press of a button.




**The Z88 could become a normal part of school life – like the calculator**

Obviously, a scheme such as this is not as simple as it first appears. There are many logistical problems which would need to be sorted out before mass implementation could take place. If the children were to use batteries, the power requirements of the Z88 might well take a school's entire funding. There would need to be either a recharging facility available on the machine or DC power supply for each machine in the classroom. A similar problem is that of transferring information from the host Archimedes or IBM machine or network to a class of 30 Z88s. How would they be linked up: one at a time, all at once?

Furthermore, how appropriate are the keyboard and screen to the needs of children? Is the clarity of the screen sufficient for prolonged use? Will the screen scratch in transit, and thereby become unreadable? How durable is the keyboard? Is the software on board appropriate to the needs of the child and if not, what modifications would need to be undertaken? How secure would schools' data systems be with every child carrying a powerful micro? How would one justify the expense of providing one micro per child? There would of course be many more questions and an overwhelming need for documentation more tailored to the needs of young users.

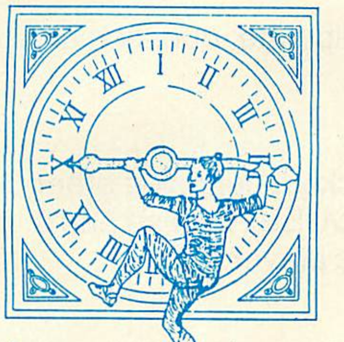
Whether Acorn realises it or not, the Z88 could be very important to them. The use of the Archimedes is likely to rise as children transfer files for project databases, wordprocessed documents or even programs between the machines. Since the Z88 has BBC Basic on board, computer studies projects may be developed on these keyboards and transferred and run on BBCs or Arcs.

The introduction of such a tool into the classroom, especially in large numbers, has serious implications for all aspects of classwork. Apart from material cost of the computers, there is a large overhead in training of teachers and pupils, of maintenance and technical support and in terms of programming support that may be undertaken centrally. The organisation of such a scheme, especially in the early stages, would be fraught with difficulties. However, since this type of opportunity has never before been available, it is worth grasping it and having at least an experiment to test the feasibility of the 'one computer per child' school of thought. Although it has been done before, particularly in the USA, the availability of cheap keyboards means that schools have a chance to try out the potential of information technology education.

It is certain that general purpose computers for all work in the classroom will be with us sooner or later. For the sake of Britain's place in the technological race, it should be sooner.

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# YELLOW PAGES

## COMPATIBILITY

| Program | Page | BBC B | B+/128 | Master 128 | Master Compact | Electron | Arc | 6502SP/ Turbo | ADFS | Econet | Shadow RAM | Monthly T/D |
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Note
1. requires Wordwise+ & Teletext adaptor
2. requires Shadow RAM

## HINTS & TIPS

See Hints & Tips, page 41

**Listing 1. Procedure & Function lister**

```
   10 REM One-line F/P Lister
   20 REM by Nicholas Sayers
   30 REM for B/B+/E/M/C
   40 REM (c) Acorn User Nov 88
   50 :
   60 *K.0 P=PA.:REP.N=P?1*256+P?2:P=P+
3:REP.P=P+1:U.?P=221OR?P=13ORP>TOP:IF?P
<>221U.P>TOP EL.REP.P=P+1:U.?P<>32:P.RI
."     "+STR$N,5);" ";M."FNPROC",ABS(?P=
242)*3,2+ABS(?P=242)*2);:REP.P=P+1:V.?P
:U.?P=13:P.:U.P>TOP|M
```

**Listing 2. Wide Text**

```
   10 REM Double Width Text
   20 REM by J D Michael
   30 REM for B/B+/E/M/C
   40 REM (c) Acorn User Nov 88
   50 :
   60 MODE 3
   70 DIM blk% 9
   80 FOR I%=&70 TO &7F
   90 READ ?I%
  100 NEXT I%
  110 INPUT LINE "Text String : " text$
  120 PRINT;
  130 PROCdouble(text$)
  140 PRINT
  150 END
```

Continued ►

◄ Hints and Tips listing 2 continued

```
  160 :
  170 DATA 0,3,12,15,48,51,60,63
  180 DATA 192,195,204,207,240,243,252,2
55
  190 :
  200 DEF PROCdouble(t$)
  210 FOR I%=1 TO LEN(t$)
  220 PROCosword(ASC(MID$(t$,I%,1)))
  230 FOR J%=0 TO 7
  240 ?(&80+J%)=?(&70+(blk%?(J%+1) AND 2
40) DIV 16)
  250 ?(&88+J%)=?(&70+(blk%?(J%+1) AND 1
5))
  260 NEXT J%
  270 VDU23,128,?&80,?&81,?&82,?&83,?&84
,?&85,?&86,?&87
  280 VDU23,129,?&88,?&89,?&8A,?&8B,?&8C
,?&8D,?&8E,?&8F
  290 VDU128,129
  300 NEXT I%
  310 ENDPROC
  320 :
  330 DEF PROCosword(c%)
  340 A%=&A
  350 X%=blk% MOD 256
  360 Y%=blk% DIV 256
  370 ?blk%=c%
  380 Z%=USR(&FFF1)
  390 ENDPROC
```

**Listing 3. Time in Wordwise+**

```
REM Teletext Date in Wordwise
REM by Colin Robertson
REM for B/B+/M/C with WW+ & TTX
REM (c) Acorn User Nov 87
REM
D$=""
VDU12,31,0,5,134
PRINT "WW+/teletext date acquisition"
VDU10,10,131
PRINT "Today's date is";
VDU130
PROCcalendar
```

Continued ►

◀ Hints & Tips listing 3 continued

```
VDU10,10,131
PRINT "To exit, press any key"
*FX15,1
IF GET THEN
DISPLAY
END

.calendar
*TTXON
*ITV
TIME=0
REPEAT
UNTIL TIME>160
L%=&16
PROCosword7A
*TTXOFF
IF?(X%+12)<>0 THEN GOTO error
I%=1
DOTHIS
D$=D$+CHR$ ?(X%+I%)
I%=I%+1
IFI%=7 THEN I%=9
TIMES 8
PRINT D$+" (held in D$)"
ENDPROC
.error
PRINT "not available"
VDU10,10,129
PRINT "Date reading error"
ENDPROC

.osword7A
X%=&0430
Y%=&04
A%=&7A
CALL &FFF1
ENDPROC
```

**Listing 4. On-screen memory display**

```
   10 REM Graphic displa
y of free memory
   20 REM by Steven Harr
is
   30 REM for B/B+/M
   40 REM (c) Acorn User
 Nov 88
   50 :
   60 MODE 7
   70 VDU 23;8202;0;0;0;
   80 DIM oscli% 40
   90 :
  100 PRINT'"Graphic dis
play of free memory."
  110 PRINT
  120 PRINT "Assemble at
 which hex.location?"
  130 INPUT "&"code$
  140 code%=EVAL("&"+cod
e$)
  150 PROCassemble(code%
)
  160 PRINT'"Enter name
to save under"
  170 REPEAT
  180 INPUT ""file$
  190 UNTIL LEN(file$)>0
 AND LEN(file$)<8
  200 PROCsave(file$,cod
e%,P%)
  210 END
  220 :
  230 DEF PROCassemble(c
ode%)
  240 oswrch=&FFEE
  250 osasci=&FFE3
  260 osbyte=&FFF4
  270 osrdch=&FFE0
  280 FOR pass=0 TO 2 ST
EP 2
  290 P%=code%
  300 [OPT pass
  310 .freemem
  320 LDA #22
  330 JSR oswrch
  340 LDA #5
  350 JSR oswrch
  360 LDA #0
  370 STA x
  380 STA x+1
  390 STA &76
  400 STA &77
  410 LDA #232
  420 STA y
  430 LDA #3
  440 STA y+1
  450 LDA &18
  460 STA pg
  470 LDA &12
  480 STA tp
  490 LDA &13
  500 STA tp+1
  510 LDA tp
  520 CMP #0
  530 BNE start
  540 LDA tp+1
  550 CMP pg
  560 BNE start
  570 LDA #1
  580 STA chck
  590 .start
  600 LDY #0
  610 .loop
  620 LDA #160
  630 STA &75
  640 .loop2
  650 LDA &77
  660 CMP pg
  670 BNE cont1
  680 LDA chck
  690 CMP #0
  700 BNE cont1
  710 .basicloop
  720 LDA &76
  730 CLC
  740 ADC #1
  750 STA &76
  760 LDA &77
  770 ADC #0
  780 STA &77
  790 LDA x
  800 CLC
  810 ADC #8
  820 STA x
  830 LDA x+1
  840 ADC #0
  850 STA x+1
  860 DEC &75
  870 LDA &75
  880 CMP #&FF
  890 BNE cont3
  900 LDA #0
  910 STA x
  920 STA x+1
  930 LDA y
  940 SEC
  950 SBC #4
  960 STA y
  970 LDA y+1
  980 SBC #0
  990 STA y+1
 1000 LDA #160
 1010 STA &75
 1020 .cont3
 1030 LDA &77
 1040 CMP #&58
 1050 BEQ quit
 1060 LDA &77
 1070 CMP tp+1
 1080 BNE basicloop
 1090 LDA &76
 1100 CMP tp
 1110 BNE basicloop
 1120 LDA #1
 1130 STA chck
 1140 .cont1
 1150 LDA (&76),Y
 1160 CMP #0
 1170 BEQ set1
 1180 LDA #2
 1190 STA col
 1200 JMP cont
 1210 .set1
 1220 LDA #1
 1230 STA col
 1240 .cont
 1250 LDX #0
 1260 .dovdu
 1270 LDA vdu,X
 1280 JSR oswrch
 1290 INX
 1300 CPX #9
 1310 BNE dovdu
 1320 .cont2
 1330 LDA &76
 1340 CLC
 1350 ADC #1
 1360 STA &76
 1370 LDA &77
 1380 ADC #0
 1390 STA &77
 1400 LDA x
 1410 CLC
 1420 ADC #8
 1430 STA x
 1440 LDA x+1
 1450 ADC #0
 1460 STA x+1
 1470 LDA &77
 1480 CMP #&58
 1490 BEQ quit
 1500 DEC &75
 1510 LDA &75
 1520 CMP #&FF
 1530 BEQ cont4
 1540 JMP loop2
 1550 .cont4
 1560 LDA #0
 1570 STA x
 1580 STA x+1
 1590 LDA y
 1600 SEC
 1610 SBC #4
 1620 STA y
 1630 LDA y+1
 1640 SBC #0
 1650 STA y+1
 1660 JMP loop
 1670 .quit
 1680 JMP instructions
 1690 .vdu
```

Continued ▶

◀ **Hints & Tips listing 4 continued**

```
1700 OPT FNequb(18)
1710 OPT FNequb(0)
1720 .col
1730 OPT FNequb(0)
1740 .vdu2
1750 OPT FNequb(25)
1760 OPT FNequb(69)
1770 .x
1780 OPT FNequw(0)
1790 .y
1800 OPT FNequw(0)
1810 .instructions
1820 LDA #31
1830 JSR oswrch
1840 LDA #0
1850 JSR oswrch
1860 LDA #19
1870 JSR oswrch
1880 LDX #0
1890 .print
1900 LDA mess,X
1910 JSR osasci
1920 INX
1930 CMP #0
1940 BNE print
1950 JSR osrdch
1960 LDA #22
1970 JSR oswrch
1980 LDA #7
 1990 JMP oswrch
 2000 .mess
 2010 OPT FNequs("&5800:
")
 2020 OPT FNequw(&D0D)
 2030 OPT FNequs("Red: E
mpty slot")
 2040 OPT FNequb(13)
 2050 OPT FNequs("Yellow
: Full slot")
 2060 OPT FNequb(13)
 2070 OPT FNequs("Black:
BASIC")
 2080 OPT FNequw(&D0D)
 2090 OPT FNequs("Press
a key")
 2100 OPT FNequw(13)
 2110 .pg OPT FNequb(0)
 2120 .tp OPT FNequw(0)
 2130 .chck OPT FNequb(0
)
 2140 ]
 2150 NEXT pass
 2160 ENDPROC
 2170 :
 2180 DEF FNequs(s$)
 2190 $P%=s$:P%=P%+LEN(s
$)
 2200 =pass
 2210 :
 2220 DEF FNequb(byte%)
 2230 ?P%=byte%:P%=P%+1
 2240 =pass
 2250 :
 2260 DEF FNequw(word%)
 2270 ?P%=word% MOD 256
 2280 P%?1=word% DIV 256
 2290 P%=P%+2
 2300 =pass
 2310 :
 2320 DEF PROCsave(file$
,s%,e%)
 2330 oscli$="SAVE "+fil
e$+" "+STR$~s%+" "+STR$~
e%
 2340 PRINT'"*";oscli$
 2350 $oscli%=oscli$
 2360 X%=oscli% MOD 256
 2370 Y%=oscli% DIV 256
 2380 CALL &FFF7
 2390 ENDPROC
```

**See Archimedes Agora, page 46**

**Listing 1. PC & ST disc reader**

```
   10 REM Agora - listing 1
   20 REM MS-DOS Disc Reader
   30 REM by Jeroen Boomgaardt
   40 REM for Archimedes only
   50 REM (c) Acorn User November 1988
   60 :
   70 ON ERROR PROCerror:RUN
   80 buflen%=(HIMEM-LOMEM-&2000) AND &7
FFFFC00
   90 DIM file$(255),block% 256,buf% buf
len%
  100 MODE 0
  110 COLOUR 0,4
  120 PRINT '"Archimedes Disc Reader V1.
00 - by Jeroen Boomgaardt"
  130 PRINT STRING$(80,CHR$(95))
  140 VDU 28,0,31,79,4
  150 PRINT " Buffer size=";buflen%;" by
tes (";buflen% DIV 1024;"K)"'
  160 REPEAT
  170 INPUT"Enter source drive (0-4): "s
ource%
  180 UNTIL source%>=0 AND source%<=4
  190 REPEAT
  200 INPUT"Enter destination (ADFS) dri
ve (0-4): "adfs%
  210 UNTIL adfs%>=0 AND adfs%<=4
  220 REPEAT
  230 @%=&90A
  240 PROCdirmsdos
  250 PROCchoosefile
  260 PROCcopymsdos
  270 UNTIL FALSE
  280 END
  290 :
  300 DEF PROCerror
  310 IF ERR=17 THEN
  320 MODE 0
  330 END
  340 ELSE
  350 VDU 7
  360 PRINT '"Error: ";REPORT$;" (Error
number &";~ERR;")"
  370 PRINT '"Press a key to restart Dis
c Reader";
  380 *FX 15
  390 key%=GET
  400 ENDPROC
  410 :
  420 DEF FNtidy(t$)
  430 LOCAL c%,i%,r$
  440 r$=""
  450 IF t$="" THEN t$=" "
  460 FOR i%=1 TO LEN(t$)
  470 c%=ASC(MID$(t$,i%,1))
  480 IF c%<>32 THEN
  490 IF c%>96 AND c%<123 THEN c%-=32
  500 r$+=CHR$(c%)
  510 ENDIF
  520 NEXT
  530 IF RIGHT$(r$,1)=CHR$(46) THEN r$=L
EFT$(r$,LEN(r$)-1)
  540 =r$
  550 :
  560 DEF PROCchoosefile
  570 REPEAT
  580 INPUT'"Please enter file to copy:
"file$
  590 file$=FNtidy(file$)
  600 found=FALSE
  610 FOR file%=0 TO noffiles%-1
  620 IF file$(file%)=file$ THEN found=T
RUE
  630 NEXT
  640 IF NOT found THEN PRINT '"Invalid
object - try again"
  650 UNTIL found
  660 ENDPROC
```

**Continued ▶**

◄ Arc Agora listing 1 continued

```
670 :
680 DEF PROCreadsector(drive%,secsize%
,secpertrk%,nofheads%,density%,discsize%
,head%,track%,sector%,where%,toread%)
690 LOCAL addr%
700 addr%=((track%*nofheads%+head%)*se
cpertrk%+sector%)*secsize%
710 block%?0=LOG(secsize%)/LOG(2)
720 block%?1=secpertrk%
730 block%?2=nofheads%
740 block%?3=density%
750 block%!4=0:block%!8=0:block%!12=0
760 block%!16=discsize%
770 block%!20=0:block%!24=0:block%!28=
0:block%!32=0:block%!36=0
780 block%!40=0:block%!44=0:block%!48=
0:block%!52=0:block%!56=0:block%!60=0
790 SYS "ADFS_DiscOp",,((block% DIV 4)
<<8)+1,(drive%<<29 OR addr%),where%,tore
ad%
800 ENDPROC
810 :
820 DEF PROCdirmsdos
830 REPEAT
840 PRINT '"Insert MS-DOS disc in driv
e ";source%;" and press a key..."'
850 *FX 15
860 key%=GET
870 PROCreadsector(source%,512,9,1,2,1
84320,0,0,1,buf%,30)
880 UNTIL ?buf%=&E9 OR ?buf%=&EB
890 secsize%=buf%!&0B AND &FFFF
900 secperclus%=buf%?&0D
910 noffats%=buf%?&10
920 maxentr%=buf%!&11 AND &FFFF
930 nofsecs%=buf%!&13 AND &FFFF
940 descr%=buf%?&15
950 secperfat%=buf%?&16
960 secpertrk%=buf%?&18
970 nofheads%=buf%?&1A
980 clussize%=secsize%*secperclus%
990 discsize%=nofsecs%*secsize%*(secpe
rtrk%+1)/secpertrk%
1000 firstfat%=1+(buf%?&E)
1010 lastfat%=firstfat%+secperfat%-1
1020 firstdir%=firstfat%+secperfat%*nof
fats%
1030 firstsec%=firstdir%+maxentr%*32/se
csize%
1040 FOR dirsec%=firstdir% TO firstsec%
-1
1050 head%=(((dirsec%-1)DIV secpertrk%)
MOD nofheads%)
1060 track%=(dirsec%-1)DIV(nofheads%*se
cpertrk%)
1070 sector%=((dirsec%-1)MOD secpertrk%
)+1
1080 PROCreadsector(source%,secsize%,se
cpertrk%+1,nofheads%,2,discsize%,head%,t
rack%,sector%,buf%+secsize%*(dirsec%-fir
stdir%),secsize%)
1090 NEXT
1100 PRINT " Volume in drive ";CHR$(65+
source%);
1110 volume$=" has no label"
1120 FOR file%=maxentr% TO 1 STEP -1
1130 offset%=buf%+(file%-1)*32
1140 IF ((offset%?11)AND %101000)=%1010
00 THEN
1150 volume$=" is "+FNname(offset%)
1160 IF volume$=" is " volume$=" has no
label"
1170 ENDIF
1180 NEXT
1190 PRINT volume$
1200 PRINT " Directory of  ";CHR$(sourc
e%+65);":\"'
1210 @%=&607
1220 count%=0
1230 FOR file%=1 TO maxentr%
1240 offset%=buf%+(file%-1)*32
1250 file$=FNname(offset%)
1260 IF file$<>CHR$(&E5) AND ((offset%?
11)AND %1100)=0 THEN
1270 time$=FNtime(offset%!&16 AND &FFFF
)
1280 date$=FNdate(offset%!&18 AND &FFFF
)
1290 length%=offset%!&1C
1300 PRINT LEFT$(file$,8);" ";RIGHT$(fi
le$,3);
1310 IF ((offset%?11)AND %10000)<>0 THE
N PRINT " <DIR>    "; ELSE PRINT ,length%
;
1320 PRINT "  "date$"  "time$
1330 count%+=1
1340 ENDIF
1350 NEXT
1360 IF count%=0 THEN PRINT "File not f
ound":noffiles%=0:ENDPROC
1370 @%=&609:PRINT count%;" File(s)";
1380 count%=0
1390 FOR file%=1 TO maxentr%
1400 offset%=buf%+(file%-1)*32
1410 file$(count%)=FNname(offset%)
1420 IF file$(count%)<>CHR$(&E5) AND ((
offset%?11)AND %11100)=0 THEN file$(coun
t%)=FNtidy(LEFT$(file$(count%),8)+"."+RI
GHT$(file$(count%),3)):count%+=1
1430 NEXT
1440 noffiles%=count%
1450 PRINT FNbytesfree;" bytes free"
1460 ENDPROC
1470 :
1480 DEF FNtime(time%)
1490 LOCAL hour%,min%,rest%,time$,hour$
,min$
1500 hour%=time% DIV 2048:rest%=time% M
OD 2048
1510 min%=rest% DIV 32
1520 IF hour%>12 THEN hour%=hour%-12:ti
me$="p" ELSE time$="a"
1530 IF hour%=0 THEN hour%=12
1540 IF hour%<10 THEN hour$=" " ELSE ho
ur$=""
1550 hour$=hour$+STR$(hour%)
1560 IF min%<10 THEN min$=":0" ELSE min
$=":"
1570 min$=min$+STR$(min%)
1580 =hour$+min$+time$
1590 :
1600 DEF FNdate(date%)
1610 LOCAL year%,month%,day%,rest%,mont
h$,day$
1620 year%=(date% DIV 512)+80:rest%=dat
e% MOD 512
1630 month%=rest% DIV 32:day%=rest% MOD
32
1640 IF month%<10 THEN month$="-0" ELSE
month$="-"
1650 month$=month$+STR$(month%)
1660 IF day%<10 THEN day$=" " ELSE day$
=""
1670 day$=day$+STR$(day%)
1680 =day$+month$+"-"+STR$(year% MOD 10
0)
1690 :
1700 DEF FNbytesfree
```

Continued ►

◀ **Arc Agora listing 1 continued**

```
 1710 FOR fatsec%=firstfat% TO lastfat%
 1720 head%=(((fatsec%-1)DIV secpertrk%)
MOD nofheads%)
 1730 track%=(fatsec%-1)DIV(nofheads%*se
cpertrk%)
 1740 sector%=((fatsec%-1)MOD secpertrk%
)+1
 1750 PROCreadsector(source%,secsize%,se
cpertrk%+1,nofheads%,2,discsize%,head%,t
rack%,sector%,buf%+secsize%*(fatsec%-fir
stfat%),secsize%)
 1760 NEXT
 1770 free%=(nofsecs%-firstsec%+1)*secsi
ze%
 1780 FOR fatpos=3 TO secperfat%*secsize
%-1.5 STEP 1.5
 1790 IF FNevalfat(fatpos)<>0 THEN free%
-=clussize%
 1800 NEXT
 1810 =free%
 1820 :
 1830 DEF FNevalfat(fatpos)
 1840 fatbyte%=INT(fatpos)+buf%
 1850 ncl%=!fatbyte% AND &FFFF
 1860 IF INT(fatpos)<>fatpos THEN ncl%=n
cl%>>4
 1870 =ncl% AND &FFF
 1880 :
 1890 DEF PROCcopymsdos
 1900 IF file$="" THEN ENDPROC
 1910 FOR dirsec%=firstdir% TO firstsec%
-1
 1920 head%=(((dirsec%-1)DIV secpertrk%)
MOD nofheads%)
 1930 track%=(dirsec%-1)DIV(nofheads%*se
cpertrk%)
 1940 sector%=((dirsec%-1)MOD secpertrk%
)+1
 1950 PROCreadsector(source%,secsize%,se
cpertrk%+1,nofheads%,2,discsize%,head%,t
rack%,sector%,buf%+secsize%*(dirsec%-fir
stdir%),secsize%)
 1960 NEXT
 1970 file%=0
 1980 REPEAT
 1990 file%+=1
 2000 offset%=buf%+(file%-1)*32
 2010 thisone$=FNname(offset%)
 2020 IF thisone$<>CHR$(&E5) AND ((offse
t%?11)AND %11100)=0 THEN thisone$=FNtidy
(LEFT$(thisone$,8)+"."+RIGHT$(thisone$,3
))
 2030 length%=offset%!&1C
 2040 start%=offset%!&1A AND &FFFF
 2050 UNTIL file%=maxentr% OR thisone$=f
ile$
 2060 IF (((length%+clussize%-1) DIV clu
ssize%)*clussize%)>buflen%-secperfat%*se
csize% THEN ERROR 20,"File too big to fi
t in buffer"
 2070 offset%=buf%+secperfat%*secsize%
 2080 PROCcluster(start%,offset%)
 2090 IF length%>clussize% THEN
 2100 FOR fatsec%=firstfat% TO lastfat%
 2110 head%=(((fatsec%-1)DIV secpertrk%)
MOD nofheads%)
 2120 track%=(fatsec%-1)DIV(nofheads%*se
cpertrk%)
 2130 sector%=((fatsec%-1)MOD secpertrk%
)+1
 2140 PROCreadsector(source%,secsize%,se
cpertrk%+1,nofheads%,2,discsize%,head%,t
rack%,sector%,buf%+secsize%*(fatsec%-fir
stfat%),secsize%)
 2150 NEXT
```

Continued ▶

◀ **Arc Agora listing 1 continued**

```
 2160 clus%=FNevalfat(1.5*start%)
 2170 WHILE clus%<>&FFF
 2180 IF clus%<>0 AND clus%<&FF7 THEN
 2190 offset%+=clussize%
 2200 PROCcluster(clus%,offset%)
 2210 ENDIF
 2220 clus%=FNevalfat(1.5*clus%)
 2230 ENDWHILE
 2240 ENDIF
 2250 PRINT '"File loaded. Insert ADFS d
isc in drive ";adfs%;" and press a key..
."'
 2260 *FX 15
 2270 key%=GET
 2280 OSCLI("MOUNT "+STR$(adfs%))
 2290 pp%=INSTR(file$,CHR$(46))
 2300 IF pp%>0 THEN file$=LEFT$(LEFT$(fi
le$,pp%-1)+"_"+MID$(file$,pp%+1,3),10)
 2310 $block%=file$:?(block%+LEN(file$))
=0
 2320 SYS "OS_File",0,block%,0,0,buf%+se
cperfat%*secsize%,buf%+secperfat%*secsiz
e%+length%
 2330 SYS "OS_File",9,block%
 2340 ENDPROC
 2350 :
 2360 DEF PROCcluster(clus%,where%)
 2370 FOR plus%=0 TO secperclus%-1
 2380 abssec%=(clus%-2)*secperclus%+firs
tsec%+plus%
 2390 head%=(((abssec%-1)DIV secpertrk%)
MOD nofheads%)
 2400 track%=(abssec%-1)DIV(nofheads%*se
cpertrk%)
 2410 sector%=((abssec%-1)MOD secpertrk%
)+1
 2420 PROCreadsector(source%,secsize%,se
cpertrk%+1,nofheads%,2,discsize%,head%,t
rack%,sector%,where%+plus%*secsize%,secs
ize%)
 2430 NEXT
 2440 ENDPROC
 2450 :
 2460 DEF FNname(offset%)
 2470 f$=""
 2480 FOR char%=0 TO 10
 2490 byte%=offset%?char%
 2500 IF byte%<32 OR byte%>126 THEN f$="
":byte%=&E5:char%=10
 2510 f$=f$+CHR$(byte%)
 2520 NEXT
 2530 =f$
```

**Listing 2. Tak Test**

```
   10 REM Agora - listing 2
   20 REM ArcTak
   30 REM by Dave Acton
   40 REM for Archimedes only
   50 REM (c) Acorn User November 1988
   60 :
   70 MODE 0
   80 PRINT "Archimedes Tak Test"'
   90 DIM code% &9000
  100 PROCassemble
  110 FOR i%=0 TO &7FFF STEP 4
  120 i%!table%=-1
  130 NEXT
  140 PRINT "Method used"TAB(27)"Answer"
TAB(35)"Time"
  150 PRINT STRING$(80,"-");
  160 TIME=0:PRINT"Basic function",FNt(1
8,12,6),TIME/100
```

Continued▶

◀ **Arc Agora listing 2 continued**

```
170 TIME=0:PRINT"Machine code",FNmc(18
,12,6),TIME/100
180 TIME=0:PRINT"Machine code + table"
,FNmctab(18,12,6),TIME/100
190 END
200 :
210 DEF FNt(x,y,z)
220 IF x<=y THEN =z ELSE =FNt(FNt(x-1,
y,z),FNt(y-1,z,x),FNt(z-1,x,y))
230 :
240 DEF FNmc(D%,C%,B%)=USR(tak)
250 :
260 DEF FNmctab(D%,C%,B%)=USR(tabtak)
270 :
280 DEF PROCassemble
290 r=0:z=1:y=2:x=3
300 tbase=4:temp=5:temp2=6
310 dimx=7:dimy=8
320 sp=13:link=14:pc=15
330 FOR pass%=0 TO 2 STEP 2
340 P%=code%
350 [OPT pass%
360 .tak
370 STMFD (sp)!,{x,y,z,link}
380 .maintak
390 CMP x,y
400 MOVLE r,z
410 LDMLEFD (sp)!,{x,y,z,pc}
420 SUB x,x,#1
430 CMP x,y
440 MOVLE r,z
450 BLGT tak
460 STMFD (sp)!,{r}
470 ADD temp,x,#1
480 SUB x,y,#1
490 MOV y,z
500 MOV z,temp
510 CMP x,y
520 MOVLE r,z
530 BLGT tak
540 STMFD (sp)!,{r}
550 ADD temp,x,#1
560 SUB x,y,#1
570 MOV y,z
580 MOV z,temp
590 CMP x,y
600 MOVLE r,z
610 BLGT tak
620 LDMFD (sp)!,{x,y}
630 MOV z,r
640 B maintak
650 :
660 .tabtak
670 ADR tbase,table%
680 ADD dimx,x,#1
690 ADD dimy,y,#1
700 MUL temp,dimx,dimy
710 MOV dimy,temp
720 .ttak
730 STMFD (sp)!,{x,y,z,link}
740 .maintabtak
750 CMP x,y
760 MOVLE r,z
770 LDMLEFD (sp)!,{x,y,z,pc}
780 MLA temp,dimx,y,x
790 MUL temp2,dimy,z
800 ADD temp,temp,temp2
810 LDR temp2,[tbase,temp,ASL #2]
820 CMN temp2,#1
830 MOVNE r,temp2
840 LDMNEFD (sp)!,{x,y,z,pc}
850 STMFD (sp)!,{temp}
860 SUB x,x,#1
870 CMP x,y
880 MOVLE r,z
890 BLGT ttak
900 STMFD (sp)!,{r}
910 ADD temp,x,#1
920 SUB x,y,#1
930 MOV y,z
940 MOV z,temp
950 CMP x,y
960 MOVLE r,z
970 BLGT ttak
980 STMFD (sp)!,{r}
990 ADD temp,x,#1
1000 SUB x,y,#1
1010 MOV y,z
1020 MOV z,temp
1030 CMP x,y
1040 MOVLE r,z
1050 BLGT ttak
1060 LDMFD (sp)!,{x,y}
1070 MOV z,r
1080 BL ttak
1090 LDMFD (sp)!,{temp}
1100 STR r,[tbase,temp,ASL #2]
1110 LDMFD (sp)!,{x,y,z,pc}
1120 :
1130 .table%
1140 ]:NEXT pass%
1150 ENDPROC
```

**Listing 3. Arc palette**

```
10 REM Agora - listing 3
20 REM 456 colours?
30 REM by Dave Lawrence
40 REM for Archimedes only
50 REM (c) Acorn User November 1988
60 :
70 MODE 15:OFF
80 n%=0
90 REPEAT
100 READ c$
110 WHILE c$<>"!"
120 PROCst(MID$(c$,1,1),b,b1)
130 PROCst(MID$(c$,2,1),g,g1)
140 PROCst(MID$(c$,3,1),r,r1)
150 FOR c%=1 TO 3
160 FOR t%=0 TO 3
170 red=r:green=g:blue=b
180 IF red<0 red=0
190 IF green<0 green=0
200 IF blue<0 blue=0
210 GCOL (blue<<4)+(green<<2)+red TINT
(t%<<6)
220 MOVE (n% MOD 19)*64+(c%*4+t%-4)*2,
(n% DIV 19)*500
230 DRAW BY 0,480
240 MOVE (n% MOD 19)*64+47-(c%*4+t%-4)
*2,(n% DIV 19)*500
250 DRAW BY 0,480
260 NEXT
270 r+=r1:g+=g1:b+=b1
280 NEXT
290 n%+=1
300 READ c$
310 ENDWHILE
320 END
330 :
```

Continued ▶

## JOE'S JOTTINGS

**◄ Arc Agora listing 3 continued**

```
   340 DEF PROCst(c$,RETURN start,RETURN
 inc)
   350 CASE c$ OF
   360 WHEN "*":start=0:inc=0
   370 WHEN "0":start=0:inc=1
   380 WHEN "1":start=1:inc=1
   390 WHEN "#":start=-1:inc=1
   400 ENDCASE
   410 ENDPROC
   420 :
   430 DATA 001,**1,##1,0*1,*01,0#1,#01,*
#1,#*1
   440 DATA 010,*1*,#1#,01*,*10,01#,#10,*
1#,#1*
   450 DATA 100,1**,1##,10*,1*0,10#,1#0,1
*#,1#*
   460 DATA 110,11*,11#,101,1*1,1#1,011,*
11,#11,000,111
   470 DATA !
```

See Joe's Jottings, page 66

**Listing 1. Crossword setup**

```
   10 REM Crossword Generator Part 1
   20 REM by Joe Telford
   30 REM for BBC B+/M/C/A/B with Shad
   40 REM (C) Acorn User November 1988
   50 :
   60 M%=20
   70 MODE 4
   80 VDU 23;8202;0;0;0;
   90 PROCsetup
  100 PROCtitle
  110 CHAIN "CWD2"
  120 :
  130 DEF PROCsetup
  140 VDU 19,0,7;0;
  150 VDU 19,1,0;0;
  160 VDU 23,128,32,80,80,80,32,0,0,0
  170 VDU 23,129,32,96,32,32,112,0,0,0
  180 VDU 23,130,32,80,16,32,112,0,0,0
  190 VDU 23,131,96,16,96,16,96,0,0,0
  200 VDU 23,132,80,80,112,16,16,0,0,0
  210 VDU 23,133,112,64,96,16,96,0,0,0
  220 VDU 23,134,32,64,96,80,32,0,0,0
  230 VDU 23,135,112,16,16,32,32,0,0,0
  240 VDU 23,136,32,80,32,80,32,0,0,0
  250 VDU 23,137,32,80,48,16,32,0,0,0
  260 VDU 23,153,24,28,246,131,246,28,24
,0
  270 VDU 23,154,24,56,111,193,111,56,24
,0
  280 VDU 23,155,1,1,1,1,1,1,1,1
  290 VDU 23,156,0,0,0,0,0,0,0,255
  300 VDU 23,157,1,1,1,1,1,1,1,255
  310 VDU 23,158,255,255,255,255,255,255
,255,255
  320 VDU 23,159,255,129,129,129,129,129
,129,255
  330 ENDPROC
  340 :
  350 DEF PROCtitle
  360 FOR I=1 TO 20
  370 PRINTTAB(1,I);STRING$(20,CHR$159)
  380 NEXT
  390 FOR I=1 TO 8
  400 READ x,y,a$,d
  410 VDU 31,x,y
  420 FOR J=1 TO LEN(a$)
  430 PRINTMID$(a$,J,1);
  440 IF d VDU 8,10
  450 NEXT
  460 NEXT
  470 PROCmess("The Acorn User Crossword
 Program",2,22)
  480 PROCmess(" Another one of Joe's Jo
ttings! ",2,25)
  490 PROCspc
  500 CLS
  510 ENDPROC
  520 :
```

Continued ►

**◄ Joe's Jottings listing 1 continued**

```
  530 DEFPROCspc
  540 PROCmess("Press",30,1)
  550 PROCmess("SPACE",30,4):PROCmess("t
o",30,7)
  560 PROCmess("go on.",30,10)
  570 REPEAT:SOUND 1,1,4,20:UNTIL INKEY(
300)=32
  580 LOCALloop
  590 FOR loop=1TO 30:PRINTTAB(30,loop);
STRING$(10," ");:NEXT
  600 ENDPROC
  610 :
  620 DEF PROCdrawwindow(x,y,w,n%,f)
  630 l=(x+1)*32:d=991-(y+n%+1)*32
  640 r=(x+w+1)*32:u=1023-(y+1)*32
  650 VDU18,0,131,24,l;d-12;r+12;u;16
  660 VDU18,0,131,24,l-8;d-4;r+4;u+8;16
  670 VDU18,0,128,24,l-4;d;r;u+4;16,26
  680 ENDPROC
  690 :
  700 DEF PROCmess(t$,x,y)
  710 PROCdrawwindow(x,y,LEN(t$)+1,0,1)
  720 COLOUR128:COLOUR 7
  730 PRINTTAB(x+1,y+1);t$;
  740 ENDPROC
  750 :
  760 DATA 5,6,ACORNUSER,0
  770 DATA 12,12,PROGRAM,0
  780 DATA 15,6,JOES,0
  790 DATA 3,11,ONE,0
  800 DATA 5,8,OF,0
  810 DATA 13,5,CROSSWORD,1
  820 DATA 5,6,ANOTHER,1
  830 DATA 15,6,JOTTINGS,1
```

**Listing 2. The Crossword designer**

```
   10 REM Crossword Generator Part 2
   20 REM By Joe Telfod
   30 REM For BBC B+/M/C/A/B with Shad
   40 REM (C) Acorn User November 1988
   50 :
   60 MODE 132
   70 PROCsetup
   80 ON ERROR PROCerr
   90 REPEAT
  100 REPEAT
  110 IF NOT sf ch=FNmenu(0,ch)
  120 IF ch<>3 PROCsub(ch)
  130 UNTIL ch=3
  140 UNTIL FNok
  150 MODE 7
  160 *FX4
  170 END
  180 :
  190 DEF PROCerr
```

Continued ►

◄ Joe's Jottings listing 2 continued

```
 200 VDU3,26:CLOSE#0:COLOUR 128:COLOUR1
:PROCcurs(0)
 210 PROCcls:m%(2)=0:m%(3)=0
 220 IF err$="W" words=0:clues=0:cwd=0:
PROCresetcw:err$=""
 230 IF err$="B" cwd=0:PROCresetcw:err$
=""
 240 IF err$="C" clues=0:err$=""
 250 IF ERR=17 AND NOTINKEY-1 PROCem("L
ast action cancelled"):ENDPROC
 260 IF ERR=198 PROCem("Disc Full: Chan
ge Disc"):ENDPROC
 270 IF ERR=190 PROCem("Catalogue Full:
 Change Disc"):ENDPROC
 280 IF ERR=179 PROCem("Directory Full:
 Change Disc"):ENDPROC
 290 REPORT:PRINT" at line ";ERL:*FX4
 300 END
 310 :
 320 DEF PROCsetup
 330 DIM cw%(M%,M%),cl(M%,3),a$(11),w$(
M%),c$(M%),i$(2),m%(3)
 340 DIM osb 13,blk 40
 350 err$="":words=0:clues=0:cwd=0:M%=2
0:ch=0:*FX4,1
 360 bem$="Please build/load crossword
first"
 370 sf=FALSE
 380 VDU 23;8202;0;0;0;
 390 VDU 19,0,7;0;19,1,0;0;
 400 PROCvalid:PROCresetcw
 410 ENVELOPE 1,0,0,0,0,0,0,0,126,-2,-1
,-1,126,100
 420 PROCcurs(0)
 430 ENDPROC
 440 :
 450 DEF PROCvalid
 460 cap$=" ABCDEFGHIJKLMNOPQRSTUVWXYZ"
 470 low$=" abcdefghijklmnopqrstuvwxyz"
 480 nos$=".0123456789"
 490 pun$=" -_!#$%&'()=?/*:+;.,<>"+CHR$
34
 500 all$=nos$+cap$+low$+pun$
 510 ENDPROC
 520 :
 530 DEF FNok
 540 PROCmess("Do you really want to ex
it? (Y/N) ",20)
 550 REPEAT A$=CHR$(GET AND 223):UNTIL
A$="Y" OR A$="N"
 560 PRINTA$
 570 PROCwind(2,20,36,0,0)
 580 =(A$="Y")
 590 :
 600 DEF PROCcurs(s%)
 610 VDU 23;10,255-s%*152;0;0;0
 620 ENDPROC
 630 :
 640 DEF FNmenu(m,c)
 650 PROCmwind(m,1)
 660 COLOUR 1:COLOUR 128
 670 PRINTTAB(mx,my);t$
 680 REPEAT
 690 RESTORE (7640+m*20)
 700 FOR I=0 TO mn-1
 710 READ a$:IF a$="<" a$=CHR$154
 720 COLOUR 1+(I=c):COLOUR 128-(I=c)
 730 PRINTTAB(mx,my+I+1);a$;
 740 IF m=0 AND I<3 OR m=1 AND ch=2 AND
(I=0 OR I=4) PRINTSPC(mw-LENa$);CHR$153
 750 NEXT
 760 REPEAT
 770 A=INSTR(CHR$138+CHR$139+CHR$13,GET
$)
 780 IF A=1 c=(c+1)MODmn
 790 IF A=2 c=(c+mn-1)MODmn
 800 UNTIL A
 810 UNTIL A=3
 820 =c
 830 :
 840 DEF PROCsub(ch)
 850 IF NOT sf sub=0:sf=TRUE
 860 REPEAT
 870 sub=FNmenu(1,sub):ex=(sub=7)
 880 IF NOT(ex) ex=FNdosub
 890 UNTIL ex<0
 900 PROCmwind(1,0)
 910 sf=FALSE
 920 ENDPROC
 930 :
 940 DEF FNdosub
 950 RESTORE 7720
 960 FOR I%=0 TO ch*7+sub
 970 READ m$
 980 NEXT
 990 =EVAL("FN"+m$)
1000 :
1010 DEF PROCmwind(m,f)
1020 RESTORE (7630+m*20)
1030 READ t$,mx,my,mn,mw
1040 IF m%(m)<>f PROCwind(mx,my,mw,mn,f
)
1050 m%(m)=f
1060 ENDPROC
1070 :
1080 DEF FNwenter(f$)
1090 PROCwind(1,11,23,19,1)
1100 PROCwind(26,11,11,2,1)
1110 PROCinf("Enter words.","To exit,",
"type a *.")
1120 VDU 28,1,30,24,11
1130 words=0
1140 err$="W"
1150 IF f$<>"" PROCoscli("EXEC "+f$)
1160 FOR word=1 TO M%
1170 REPEAT
1180 IF word<10:PRINTTAB(0,word-1);" ";
word;":";:ELSE:PRINTTAB(0,word-1);word;"
:";
1190 w$(word)=FNgpi(20,0,nos$+cap$+"*")
1200 UNTIL w$(word)>" "
1210 IF LEFT$(w$(word),1)="*" words=wor
d-1:word=M%:IF words=0 words=-1
1220 NEXT word
1230 IF words=0 words=M%
1240 IF words=-1 words=0
1250 cwd=0:err$="":VDU26
1260 PROCresetcw
1270 PROCcls
1280 PROCwind(1,11,37,19,0)
1290 =0
1300 :
1310 DEF FNwsave
1320 IF words=0 PROCem("No words to sav
e"):=0
1330 f$=FNsname("words","W")
1340 IF f$="" PROCcls:=0
1350 PROCwind(1,25,37,3,1)
1360 VDU 28,1,28,38,25
1370 PROCoscli("SPOOL "+f$)
1380 FOR loop=1 TO words
1390 PRINT w$(loop)
1400 NEXT
1410 *SPOOL
1420 PROCcls:VDU26
1430 =0
1440 :
1450 DEF FNwload
```

Continued ►

# JOE'S JOTTINGS

◀ **Joe's Jottings listing 2 continued**

```
1460 f$=FNlname("Load words","W")
1470 IF f$="" PROCcls:=0
1480 =FNwenter(f$)
1490 :
1500 DEF FNlista(v)
1510 IF cwd=0 PROCem(bem$):=0
1520 PROCwind(1,15,37,15,1)
1530 VDU 28,1,30,38,15
1540 df=0:VDU 12,v:IF v=3 VDU 14
1550 PRINT''"ANSWERS"''"Across:"
1560 FOR loop=1 TO words
1570 IF df=0 AND cl(loop,2)=0 PRINT'"Do
wn:":df=1
1580 PRINTcl(loop,3);" : ";w$(loop)
1590 NEXT:VDU3,26,15
1600 PROCspc
1610 =0
1620 :
1630 DEF FNcenter(f$)
1640 IF cwd=0 PROCem(bem$):PROCcls:=0
1650 PROCwind(6,12,26,0,1)
1660 PRINTTAB(6,12);"Please enter all t
he clues."
1670 PROCwind(4,17,30,2,1)
1680 err$="C"
1690 clues=0
1700 IF f$<>"" PROCoscli("EXEC "+f$)
1710 FOR clue=1 TO words
1720 wrd$=STR$(cl(clue,3))
1730 IF cl(clue,3)<10 wrd$=" "+wrd$
1740 IF cl(clue,2)=0 wrd$=wrd$+" DOWN
" ELSE wrd$=wrd$+" ACROSS "
1750 wrd$=wrd$+"is: "
1760 PROCmess(wrd$+w$(clue)+STRING$(21-
LENw$(clue)," "),15)
1770 VDU28,5,20,34,18
1780 REPEATVDU30
1790 c$(clue)=FNgpi(60,0,all$)
1800 UNTIL c$(clue)>""
1810 VDU26
1820 NEXT clue
1830 err$="":clues=words
1840 PROCcls
1850 =0
1860 :
1870 DEF FNcsave
1880 IF words=0 OR cwd=0 PROCem("No clu
es to save"):=0
1890 f$=FNsname("clues","C")
1900 IF f$="" PROCcls:=0
1910 PROCwind(1,25,37,3,1)
1920 VDU 28,1,28,38,25
1930 PROCoscli("SPOOL "+f$)
1940 FOR loop=1 TO words
1950 PRINTc$(loop)
1960 NEXT
1970 *SPOOL
1980 PROCcls:VDU 26
1990 =0
2000 :
2010 DEF FNcload
2020 IF cwd=0 PROCem(bem$):PROCcls:=0
2030 f$=FNlname("Load clues","C")
2040 IF f$="" PROCcls:=0
2050 =FNcenter(f$)
2060 :
2070 DEF FNlistc(v)
2080 IF clues=0 PROCem("Please enter cl
ues first"):=0
2090 PROCwind(1,15,37,15,1)
2100 VDU 28,1,30,38,15
2110 df=0:VDU 12,v:IF v=3 VDU 14
2120 PRINT''"CLUES"''"Across:"
2130 FOR loop=1 TO clues
2140 IF df=0 AND cl(loop,2)=0 PRINT'"Do
wn:":df=1
2150 PRINTcl(loop,3);" : ";c$(loop)
2160 NEXT:VDU3,26,15
2170 PROCspc
2180 =0
2190 :
2200 DEF FNbuild
2210 IF words=0 PROCem("No words to fit
"):=0
2220 cwdtype=FNmenu(2,0)+1
2230 COLOUR128:COLOUR1
2240 IF cwdtype=3 PROCmwind(2,0):=0
2250 PROCwind(1,11,21,19,1)
2260 PROCwind(26,11,11,2,1)
2270 FOR I%=0 TO 19
2280 PRINTTAB(2,I%+11);STRING$(20,CHR$1
59)
2290 NEXT
2300 PROCinf("Blanking","grid.","")
2310 cwd=0:PROCresetcw
2320 PROCinf("Sorting","words.","")
2330 err$="W":PROCsort:err$=""
2340 PROCinf("Fitting","words.","")
2350 err$="B":PROCfit:err$=""
2360 IF cwd<>2 cwd=1
2370 IF cwd=1 PROCnumbersquares
2380 PROCspc:PROCmwind(2,0)
2390 =0
2400 :
2410 DEF PROCfit
2420 x=0:REPEAT:x=x+1
2430 PROCfitword(x):VDU 26
2440 UNTIL x>=words
2450 ENDPROC
2460 :
2470 DEF PROCfitword(x)
2480 PRINTTAB(26,11);"Fitting"
2490 PRINTTAB(26,12);"word ";x
2500 PRINTTAB(26,13);"from ";words
2510 VDU 28,2,30,23,11
2520 IF x=1 PROCfitword1:ENDPROC
2530 fitdone=FALSE:state=FALSE
2540 REPEAT
2550 IF cwdtype=1 fitdone=FNclosedloop
2560 IF cwdtype=2 fitdone=FNopenloop
2570 IF NOT fitdone state=FNxchange(x)
2580 UNTIL state OR fitdone
2590 IF FNprint(3)
2600 IF state AND NOT fitdone AND x=wor
ds cwd=FNloselast
2610 ENDPROC
2620 :
2630 DEF PROCfitword1
2640 dir=RND(2)-1
2650 IF dir=1 PROCfith1 ELSE PROCfitv1
2660 IF FNprint(3)
2670 ENDPROC
2680 :
2690 DEF PROCnumbersquares
2700 PROCinf("Numbering","Squares","")
2710 LOCAL x,y,n:n=1
2720 FOR y=1 TO M%:FOR x=1 TO M%
2730 IF cw%(x,y)<>0 PROCcheckstart(x,y)
2740 NEXT:NEXT
2750 PROCsortad
2760 startdown=FNfinddown
2770 PROCsortnos(1,startdown-1,"across"
)
2780 PROCsortnos(startdown,words,"down"
)
2790 ENDPROC
2800 :
2810 DEF FNfinddown
```

**Continued** ▶

◀ **Joe's Jottings listing 2 continued**

```
2820 LOCALn:n=0:REPEAT:n=n+1:UNTIL cl(n
,2)=0
2830 =n
2840 :
2850 DEF PROCsortad
2860 PROCinf("Sorting","across &","down
")
2870 LOCALinloop,outloop,pointer
2880 FOR outloop=1 TO words-1
2890 pointer=outloop
2900 FOR inloop=outloop+1 TO words
2910 IF cl(inloop,2)>cl(pointer,2) poin
ter=inloop
2920 NEXTinloop
2930 IF pointer<>outloop PROCswitch(poi
nter,outloop)
2940 NEXToutloop
2950 ENDPROC
2960 :
2970 DEF PROCsortnos(start,end,t$)
2980 PROCinf("Number","sort "+t$,"")
2990 LOCALinloop,outloop,pointer
3000 FOR outloop= start TO end-1
3010 pointer=outloop
3020 FOR inloop=outloop+1 TO end
3030 IF cl(inloop,3)<cl(pointer,3) poin
ter=inloop
3040 NEXTinloop
3050 IF pointer<>outloop PROCswitch(poi
nter,outloop)
3060 NEXToutloop
3070 ENDPROC
3080 :
3090 DEF PROCswitch(a,b)
3100 LOCALspare$,spare,loop
3110 spare$=w$(a):w$(a)=w$(b):w$(b)=spa
re$
3120 FOR loop=0 TO 3
3130 spare=cl(a,loop):cl(a,loop)=cl(b,l
oop):cl(b,loop)=spare
3140 NEXT
3150 ENDPROC
3160 :
3170 DEF PROCcheckstart(x,y)
3180 LOCAL loop,flag
3190 FOR loop=1 TO words
3200 IF cl(loop,0)=x AND cl(loop,1)=y c
l(loop,3)=n:flag=1
3210 NEXT
3220 IF flag=1 n=n+1
3230 ENDPROC
3240 :
3250 DEF PROCsort
3260 LOCALx,y
3270 FOR x=1 TO words:FOR y=1 TO words-
1
3280 IF LENw$(y)<LENw$(y+1) PROCswap(y,
y+1)
3290 NEXT:NEXT
3300 ENDPROC
3310  :
3320 DEF PROCswap(a,b):LOCAL A$
3330 A$=w$(a):w$(a)=w$(b):w$(b)=A$
3340 ENDPROC
3350 :
3360 DEF FNxchange(x)
3370 LOCALbubbleup
3380 IF words=x THEN =TRUE
3390 wspare$=w$(x)
3400 FOR bubbleup=x TO words-1
3410 w$(bubbleup)=w$(bubbleup+1)
3420 NEXT
3430 w$(words)=wspare$
3440 =FALSE
3450 :
3460 DEF FNloselast
3470 LOCALA$
3480 PROCmess(w$(words)+" won't fit.",2
3)
3490 PROCmess("(L)ose or (K)eep it?",26
)
3500 REPEAT:A$=CHR$(GET AND 223):UNTIL
A$="L" OR A$="K"
3510 PRINTA$
3520 IF A$="K" PROCmess("Word kept - Re
build crossword",29):PROCresetcw:=2
3530 w$(words)="":words=words-1
3540 PROCmess("Word deleted - crossword
OK",29)
3550 =TRUE
3560 :
3570 DEF PROCfith1
3580 py=INT(M%/2):px=py-INT(LENw$(1)/2)
:cl(1,0)=px:cl(1,1)=py:cl(1,2)=dir
3590 PROCplace(1,w$(1))
3600 ENDPROC
3610 :
3620 DEF PROCfitv1
3630 px=INT(M%/2):py=px-INT(LENw$(1)/2)
:cl(1,0)=px:cl(1,1)=py:cl(1,2)=dir
3640 PROCplace(1,w$(1))
3650 ENDPROC
3660 :
3670 DEF PROCplace(w,t$)
3680 VDU 31,px,py
3690 IF cl(w,2)=0 PROCplacev(w,t$)
3700 IF cl(w,2)=1 PROCplaceh(w,t$)
3710 ENDPROC
3720 :
3730 DEF PROCplacev(w,t$)
3740 FOR y=cl(w,1) TO cl(w,1)+LENt$-1
3750 cw%(cl(w,0),y)=ASCMID$(t$,1+y-cl(w
,1),1)
3760 NEXT:ENDPROC
3770 :
3780 DEF PROCplaceh(w,t$)
3790 FOR x=cl(w,0) TO cl(w,0)+LENt$-1
3800 cw%(x,cl(w,1))=ASCMID$(t$,1+x-cl(w
,0),1)
3810 NEXT:ENDPROC
3820 :
3830 DEF PROCresetcw
3840 FOR y=1 TO M%:FOR x=1 TO M%:cw%(y,
x)=0:NEXT:NEXT
3850 ENDPROC
3860 :
3870 DEF FNclosedloop
3880 LOCALloop
3890 FOR loop=1 TO x-1
3900 fitdone=FNfit(w$(x),loop,cl(loop,2
))
3910 IF fitdone loop=x-1
3920 NEXT
3930 =fitdone
3940 :
3950 DEF FNopenloop
3960 LOCALloop
3970 FORloop=x-1 TO 1 STEP -1
3980 fitdone=FNfit(w$(x),loop,cl(loop,2
))
3990 IF fitdone loop=1
4000 NEXT
4010 =fitdone
4020 :
4030 DEF FNfit(w$,pos,dir)
4040 IF dir=0 THEN =FNfith(w$,pos)
4050 IF dir=1 THEN =FNfitv(w$,pos)
4060 =FALSE
```

**Continued** ▶

**◄ Joe's Jottings listing 2 continued**

```
 4070 :
 4080 DEF FNfith(w$,pos)
 4090 dumdir=RND(2)
 4100 IF dumdir=1 THEN =FNfithdown(w$,po
s)
 4110 IF dumdir=2 THEN =FNfithup(w$,pos)
 4120 =FALSE
 4130 :
 4140 DEF FNfithdown(w$,pos)
 4150 startx=cl(pos,0)
 4160 starty=cl(pos,1)
 4170 ltf=LENw$(pos)
 4180 LOCALcloop,wloop,dumfit
 4190 dumfit=FALSE
 4200 FOR cloop=starty TO starty+ltf
 4210 FOR wloop=1 TO LENw$
 4220 IF cloop<=M% THEN IF cw%(startx,cl
oop)=ASCMID$(w$,wloop,1) dumfit=FNtryfit
h(startx,cloop,wloop,w$)
 4230 IF dumfit wloop=LENw$
 4240 NEXTwloop
 4250 IF dumfit cloop=starty+ltf
 4260 NEXTcloop
 4270 =dumfit
 4280 :
 4290 DEF FNfithup(w$,pos)
 4300 ltf=LENw$(pos)
 4310 startx=cl(pos,0)
 4320 starty=cl(pos,1)+ltf
 4330 LOCALcloop,wloop,dumfit
 4340 dumfit=FALSE
 4350 FOR cloop=starty TO starty-ltf STE
P -1
 4360 FOR wloop=1 TO LENw$
 4370 IF cloop<=M% THEN IF cw%(startx,cl
oop)=ASCMID$(w$,wloop,1) dumfit=FNtryfit
h(startx,cloop,wloop,w$)
 4380 IF dumfit wloop=LENw$
 4390 NEXTwloop
 4400 IF dumfit cloop=starty-ltf
 4410 NEXTcloop
 4420 =dumfit
 4430 :
 4440 DEF FNtryfith(cx,cy,wl,w$)
 4450 LOCAL loop,realfit
 4460 realfit=FALSE
 4470 FOR loop=1 TO LENw$
 4480 realfit=FNfhp(loop,w$,cx-wl+loop,c
y)
 4490 IF NOT realfit loop=LENw$
 4500 NEXTloop
 4510 IF NOT realfit THEN =FALSE
 4520 FOR loop=1 TO LENw$
 4530 cw%(cx-wl+loop,cy)=ASCMID$(w$,loop
,1)
 4540 NEXT
 4550 cl(x,0)=cx-wl+1
 4560 cl(x,1)=cy
 4570 cl(x,2)=1
 4580 =TRUE
 4590 :
 4600 DEF FNfhp(loop,w$,xl,yl)
 4610 IF (xl-loop)<0 THEN = FALSE
 4620 IF (xl<1 OR xl>M%) THEN =FALSE
 4630 IF (cw%(xl,yl)<>0 AND cw%(xl,yl)<>
ASCMID$(w$,loop,1)) THEN =FALSE
 4640 IF (yl+1)<=M% THEN IF (cw%(xl,yl+1
)<>0 AND cw%(xl,yl)<>ASCMID$(w$,loop,1))
 THEN =FALSE
 4650 IF (yl-1)>=0 THEN IF (cw%(xl,yl-1)
<>0 AND cw%(xl,yl)<>ASCMID$(w$,loop,1))
THEN =FALSE
 4660 IF (xl+1)<=M% THEN IF (cw%(xl+1,yl
)<>0 AND cw%(xl+1,yl)<>ASCMID$(w$,loop+1
,1)) THEN =FALSE
 4670 IF cw%(xl-loop,yl)<>0 THEN =FALSE
 4680 =TRUE
 4690 :
 4700 DEF FNfitv(w$,pos)
 4710 dumdir=RND(2)
 4720 IF dumdir=1 THEN =FNfitvleftright(
w$,pos)
 4730 IF dumdir=2 THEN =FNfitvrightleft(
w$,pos)
 4740 =FALSE
 4750 :
 4760 DEF FNfitvleftright(w$,pos)
 4770 startx=cl(pos,0)
 4780 starty=cl(pos,1)
 4790 ltf=LENw$(pos)
 4800 LOCALcloop,wloop,dumfit
 4810 dumfit=FALSE
 4820 FOR cloop=startx TO startx+ltf
 4830 FOR wloop=1 TO LENw$
 4840 IF cloop<=M% THEN IF cw%(cloop,sta
rty)=ASCMID$(w$,wloop,1) THEN dumfit=FNt
ryfitv(cloop,starty,wloop,w$)
 4850 IF dumfit wloop=LENw$
 4860 NEXTwloop
 4870 IF dumfit cloop=startx+ltf
 4880 NEXTcloop
 4890 =dumfit
 4900 :
 4910 DEF FNfitvrightleft(w$,pos)
 4920 ltf=LENw$(pos)
 4930 startx=cl(pos,0)+ltf
 4940 starty=cl(pos,1)
 4950 LOCALcloop,wloop,dumfit
 4960 dumfit=FALSE
 4970 FOR cloop=startx TO startx-ltf STE
P -1
 4980 FOR wloop=1 TO LENw$
 4990 IF cloop<=M% THEN IF cw%(cloop,sta
rty)=ASCMID$(w$,wloop,1) dumfit=FNtryfit
v(cloop,starty,wloop,w$)
 5000 IF dumfit wloop=LENw$
 5010 NEXTwloop
 5020 IF dumfit cloop=startx-ltf
 5030 NEXTcloop
 5040 =dumfit
 5050 :
 5060 DEF FNtryfitv(cx,cy,wl,w$)
 5070 LOCAL loop,realfit
 5080 realfit=FALSE
 5090 FOR loop=1 TO LENw$
 5100 realfit=FNfvp(loop,w$,cx,cy-wl+loo
p)
 5110 IF NOT realfit loop=LENw$
 5120 NEXTloop
 5130 IF NOT realfit THEN =FALSE
 5140 FOR loop=1 TO LENw$
 5150 cw%(cx,cy-wl+loop)=ASCMID$(w$,loop
,1)
 5160 NEXT
 5170 cl(x,0)=cx
 5180 cl(x,1)=cy-wl+1
 5190 cl(x,2)=0
 5200 =TRUE
 5210 :
 5220 DEF FNfvp(loop,w$,xl,yl)
 5230 IF (yl-loop)<0 THEN =FALSE
 5240 IF (yl<1 OR yl>M%) THEN =FALSE
 5250 IF (cw%(xl,yl)<>0 AND cw%(xl,yl)<>
ASCMID$(w$,loop,1))THEN =FALSE
 5260 IF (xl+1)<=M% THEN IF (cw%(xl+1,yl
)<>0 AND cw%(xl,yl)<>ASCMID$(w$,loop,1))
 THEN =FALSE
```

Continued ►

# JOE'S JOTTINGS

◄ Joe's Jottings listing 2 continued

```
5270 IF (xl-1)>=0 THEN IF (cw%(xl-1,yl)<>0 AND cw%(xl,yl)<>ASCMID$(w$,loop,1)) THEN =FALSE
5280 IF (yl+1)<=M% THEN IF (cw%(xl,yl+1)<>0 AND cw%(xl,yl+1)<>ASCMID$(w$,loop+1,1)) THEN =FALSE
5290 IF cw%(xl,yl-loop)<>0 THEN =FALSE
5300 =TRUE
5310 :
5320 DEF FNxsave
5330 IF cwd=0 PROCem("No crossword to save"):=0
5340 f$=FNsname("crossword","X")
5350 IF f$="" PROCcls:=0
5360 PROCmess("Please wait: Crossword Saving",29)
5370 a%=OPENOUTf$
5380 PRINT #a%,words
5390 FOR I%=1 TO words
5400 PRINT#a%,w$(I%)
5410 NEXT
5420 PRINT #a%,M%
5430 FOR I%=1 TO M%
5440 FOR J%=1 TO M%
5450 BPUT#a%,cw%(I%,J%)
5460 NEXT
5470 FOR J%=0 TO 3
5480 PRINT#a%,cl(I%,J%)
5490 NEXT
5500 NEXT
5510 CLOSE#a%
5520 PROCcls
5530 =0
5540 :
5550 DEF FNxload
5560 f$=FNlname("Load crossword","X")
5570 IF f$="" PROCcls:=0
5580 PROCmess("Please wait: Crossword Loading",29)
5590 cwd=0:words=0:a%=OPENUPf$
5600 INPUT #a%,words
5610 FOR I%=1 TO words
5620 INPUT #a%,w$(I%)
5630 NEXT
5640 INPUT #a%,M%
5650 FOR I%=1 TO M%
5660 FOR J%=1 TO M%
5670 cw%(I%,J%)=BGET#a%
5680 NEXT
5690 FOR J%=0 TO 3
5700 INPUT #a%,cl(I%,J%)
5710 NEXT
5720 NEXT
5730 CLOSE #a%
5740 cwd=1
5750 PROCcls
5760 =0
5770 :
5780 DEF FNdword(v)
5790 IF cwd=0 PROCem(bem$):=0
5800 PROCwind(1,11,21,19,1)
5810 VDU 28,2,30,23,11
5820 IFFNprint(v)
5830 IF v=3 VDU 26:PROCspc
5840 =0
5850 :
5860 DEF FNprint(v)
5870 LOCAL x,y
5880 VDU 30,v
5890 FOR y=1 TO M%:IF v=2 VDU 1,14
5900 FOR x=1 TO M%
5910 IF v=3 AND cw%(x,y)=0 VDU 159
5920 IF v=2 AND cw%(x,y)=0 VDU 42
5930 IF cw%(x,y)<>0 VDU cw%(x,y);
5940 NEXT:IF y<>M% PRINT
5950 NEXT:VDU 3
5960 =0
5970 :
5980 DEF FNpmenu
5990 IF cwd=0 PROCem(bem$):=0
6000 pc=FNmenu(3,0)
6010 IF pc=0 pc=FNdword(2)
6020 IF pc=1 PROCpcwd("S")
6030 IF pc=2 PROCpcwd("L")
6040 PROCcls:VDU26:PROCmwind(3,0)
6050 =0
6060 :
6070 DEF PROCpcwd(t$)
6080 VDU 28,0,31,39,11,29,0;0;2,1,27,1,65,1,8,3
6090 PROCpoutline(1,INT(M%/2),t$)
6100 PROCpoutline(INT(M%/2)+1,M%,t$)
6110 VDU 2,1,27,1,64,3,12
6120 ENDPROC
6130 :
6140 DEF PROCpoutline(start,end,t$)
6150 COLOUR129:CLS:COLOUR128
6160 db$=CHR$10+CHR$8+CHR$8:up$=CHR$(11)
6170 blk$=CHR$(158)+CHR$(158)+db$+CHR$(158)+CHR$(158)+up$
6180 opn$=CHR$(32)+CHR$(155)+db$+CHR$(156)+CHR$(157)+up$
6190 LOCALx,y
6200 VDU30
6210 FOR y=start TO end:FOR x=1 TO M%
6220 IF cw%(x,y)=0 PRINTblk$;:ELSE PRINTopn$;
6230 NEXT:IF y<>end PRINT
6240 NEXT
6250 PROCnumerate(start,end)
6260 MOVE 0,0:DRAW0,671
6270 IF t$="L" PROCdump(16,960,3) ELSE PROCdump(32,640,1)
6280 ENDPROC
6290 :
6300 DEF PROCnumerate(s,e)
6310 LOCALloop
6320 FOR loop=1 TO words
6330 IF cl(loop,1)>=s AND cl(loop,1)<=e PROCputno(cl(loop,0),cl(loop,1)-(s-1),cl(loop,3))
6340 NEXT
6350 ENDPROC
6360 :
6370 DEF PROCputno(x,y,n)
6380 x=(x-1)*64+4:y=664-((y-1)*64)
6390 VDU5
6400 IF n>=10 MOVEx,y:VDU128+(n DIV 10):n = n MOD 10:x=x+16
6410 MOVEx,y:VDU128+n
6420 VDU4
6430 ENDPROC
6440 :
6450 DEF PROCdump(st,n,b)
6460 FOR Y%=671 TO 31+st STEP -st
6470 VDU 2,1,27,1,76,1,n MOD256,1,n DIV256
6480 FOR X%=0 TO 1276 STEP 4:A%=0
6490 FOR Z%=0 TO st-4 STEP 4
6500 A%=A%*(b+1)+POINT(X%,Y%-Z%)*b
6510 NEXT
6520 PRINTSTRING$(n/320,CHR$1+CHR$A%);
6530 NEXT:IF Y%<>st VDU 1,10
6540 NEXT:VDU 3
6550 ENDPROC
6560 :
6570 DEF FNdel(d$)
```

Continued ►

# YELLOW PAGES

## JOE'S JOTTINGS

**◀ Joe's Jottings listing 2 continued**

```
6580 f$=FNlname("Delete file",d$)
6590 IF f$<>"" PROCoscli("DELETE "+f$)
6600 PROCcls:VDU 26
6610 =0
6620 :
6630 DEF FNcat(c$,f)
6640 PROCwind(1,17,37,10,1)
6650 PROCmess("Files available:",15)
6660 VDU 28,1,27,38,17:t=0:p=0
6670 PROCoscli("DIR "+c$)
6680 ?osb=0:osb!1=blk:osb!9=0
6690 X%=osb MOD 256:Y%=osb DIV 256:A%=8
6700 REPEAT:osb!5=1:CALL&FFD1
6710 IF osb!5=0 osb!1=blk:?(blk+1+?blk)
=13:PRINTTAB(p);$(blk+1);:t=t+1
6720 p=p+12:IF p=36 p=0:PRINT
6730 UNTIL osb!5=1
6740 IF t=0 PRINTTAB(16,4);"<none>"
6750 IF f PROCspc
6760 *DIR $
6770 REM*DIR 1988.NOV.DISC
6780 =t
6790 :
6800 DEF FNsname(t$,p$)
6810 PROCwind(21,1,LEN(t$)+8,2,1)
6820 PRINTTAB(21,1);"Save ";t$;" as ";
6830 REPEAT:PRINTTAB(23,3);p$;".";
6840 f$=FNgpi(7,0,all$):UNTIL f$>" "
6850 f$=p$+"."+f$:a%=OPENUPf$:CLOSE#a%
6860 IF a%<>0 PROCem("That name is in u
se"):=""
6870 =f$
6880 :
6890 DEF FNlname(t$,p$)
6900 IFFNcat(p$,0)=0 PROCem("No files t
o load"):=""
6910 PROCwind(21,1,LEN(t$)+3,2,1)
6920 PRINTTAB(21,1);t$;
6930 REPEAT:PRINTTAB(23,3);p$;".";
6940 f$=FNgpi(7,0,all$):UNTIL f$>" "
6950 f$=p$+"."+f$:a%=OPENUPf$:CLOSE#a%
6960 IF a%=0 PROCem("Can't find that fi
le"):=""
6970 VDU 28,0,31,39,14,12
6980 =f$
6990 :
7000 DEF PROCwind(x,y,w,n%,f)
7010 l=x*32:d=991-(y+n%)*32
7020 r=(x+w+1)*32:u=1023-y*32
7030 VDU18,0,128,24,l-12;d-16;r+16;u+12
;16
7040 IF f=0 ENDPROC
7050 VDU18,0,131,24,l;d-12;r+12;u;16
7060 VDU18,0,131,24,l-8;d-4;r+4;u+8;16
7070 VDU18,0,128,24,l-4;d;r;u+4;16,26
7080 ENDPROC
7090 :
7100 DEF PROCcls
7110 PROCwind(1,11,37,19,0)
7120 PROCwind(21,1,17,11,0)
7130 ENDPROC
7140 :
7150 DEF PROCmess(t$,y)
7160 x=19-INT((LENt$)/2)
7170 PROCwind(x,y,LEN(t$),0,1)
7180 COLOUR128:COLOUR 7
7190 PRINTTAB(x,y);t$;
7200 ENDPROC
7210 :
7220 DEF PROCinf(i$(0),i$(1),i$(2))
7230 FOR i%=0 TO 2
7240 PRINTTAB(26,11+i%);SPC12
7250 PRINTTAB(26,11+i%);i$(i%)
7260 NEXT
```

Continued ▶

**◀ Joe's Jottings listing 2 continued**

```
7270 ENDPROC
7280 :
7290 DEF PROCspc
7300 PROCwind(26,11,11,2,1)
7310 PROCinf("Press SPACE","to return",
"to menu.")
7320 REPEAT:SOUND 1,1,4,20:UNTIL INKEY(
300)=32
7330 PROCcls
7340 ENDPROC
7350 :
7360 DEF PROCem(t$)
7370 PROCmess(t$,29)
7380 SOUND1,1,4,10:a=INKEY200
7390 PROCcls
7400 ENDPROC
7410 :
7420 DEF FNgpi(len,effect,valid$)
7430 PROCcurs(1)
7440 LOCALa$,b
7450 a$=""
7460 PRINTSTRING$(len,".");STRING$(len,
CHR$(8));:REM*FX15,1
7470 b=GET:IF b=13 PROCcurs(0):=a$
7480 IF b<32 THEN 7470
7490 IF b=127 AND a$="" THEN 7470
7500 IF b=127 a$=LEFT$(a$,LEN(a$)-1):PR
INTCHR$b;".";CHR$(8);:GOTO7470
7510 IF effect=0 THEN7540
7520 IF effect=1 b=b AND 223 ELSE b=b O
R32
7530 IF effect=3 AND(RIGHT$(a$,1)=" " O
R a$="") b=b AND 223
7540 IF LEN(a$)=len OR INSTR(valid$,CHR
$b)=0 SOUND1,1,4,20:GOTO7470
7550 PRINTCHR$b;:a$=a$+CHR$b:GOTO7470
7560 :
7570 DEF PROCoscli($blk)
7580 LOCAL X%,Y%
7590 X%=blk MOD 256:Y%=blk DIV 256
7600 CALL &FFF7
7610 ENDPROC
7620 :
7630 DATA Main Menu,1,1,4,9
7640 DATA Words,Clues,Grids,Quit
7650 DATA Actions,12,1,8,7
7660 DATA New,Save,Load,Display,Print,C
atalog,Delete,<
7670 DATA Format,21,1,3,6
7680 DATA Tight,Open,<
7690 DATA Method,21,1,4,6
7700 DATA Draft,Small,Large,<
7710 :
7720 DATA wenter(""),wsave,wload,lista(
3),lista(2),"cat(""W"",1)",del("W")
7730 DATA center(""),csave,cload,listc(
3),listc(2),"cat(""C"",1)",del("C")
7740 DATA build,xsave,xload,dword(3),pm
enu,"cat(""X"",1)",del("X")
```

**'How to enter' for Joe's Crossword:**
**Lines 6760 and 6770 of 'CWD2' should be changed according to which filing system you are using.**

```
DISC:                        ACORN NET:
      6760 DIR $                   6760 *DIR
      6770 REM                     6770 *DIR dir1.dir2....

ADFS:                        SJ NET:
      6760 *DIR ^                  6760 *DIR ^
      6770 REM                     6770 REM
```

# LIFE

◄ See Life on the Line, page 80

**Listing 1. One-dimensional life**

```
10 REM 1D Life
20 REM by Susan Stepney
30 REM for B/B+/M/C/E/A
40 REM (c) Acorn User November 1988
50 :
60 ON ERROR MODE 7:PROCerror
70 MODE 7
80 PROCsetup
90 MODE mode%
100 VDU 23,1,0;0;0;0;
110 PROCscreen
120 WAIT=GET
130 END
140 :
150 DEF PROCsetup
160 PROCparams
170 mode%=2
180 M%=160*2^(2-(mode% MOD 3))
190 line%=256
200 xres%=1280/M%
210 yres%=1024/line%
220 DIM c1% M%
230 DIM c2% M%
240 IF rnd PROCinitrnd ELSE PROCinitseed
250 ENDPROC
260 :
270 DEF PROCscreen
280 LOCAL A%,B%,X%,Y%
290 Y%=1023
300 FOR J%=0 TO line%-1
310 IF J% MOD 2=0 THEN A%=c1%:B%=c2% ELSE A%=c2%:B%=c1%
320 FOR I%=0 TO N%-1
330 GCOL 0,?(A%+I%)
340 PLOT 69,I%*xres%,Y%
350 GCOL 0,?(A%+M%-1-I%)
360 PLOT 69,(M%-1-I%)*xres%,Y%
370 index%=?(A%+(I%-N%+M%) MOD M%)
380 index2%=?(A%+(M%-1-I%-N%) MOD M%)
390 FOR K%=-N%+1 TO N%
400 index%=index%+?(A%+(I%+K%+M%)MOD M%)
410 index2%=index2%+?(A%+ (M%-1-I%+K%) MOD M%)
420 NEXT
430 ?(B%+I%)=rule%(index%)
440 ?(B%+M%-1+I%)=rule%(index2%)
450 NEXT I%
460 X%=N%*xres%
470 FOR I%=N% TO M%-1-N%
480 GCOL 0,?(A%+I%)
490 PLOT 69,X%,Y%
500 index%=?(A%+I%-N%)
510 FOR K%=-N%+1 TO N%
520 index%=index%+?(A%+I%+K%)
530 NEXT
540 ?(B%+I%)=rule%(index%)
550 X%=X%+xres%
560 NEXT I%
570 Y%=Y%-yres%
580 NEXT J%
590 ENDPROC
600 :
610 DEF PROCerror
620 VDU 23,1,1;0;0;0;
630 REPORT:PRINT " on line ";ERL
640 END
650 ENDPROC
660 :
670 DEF PROCparams
680 INPUT "neighbourhood      N : "N%
690 INPUT "states             S : "S%
700 dim%=(S%-1)*(2*N%+1)+1
710 INPUT "rule               R : "rule$
720 IF LEN(rule$)<dim% rule$=STRING$(dim%-LEN(rule$),"0")+rule$
730 DIM rule%(dim%)
740 FOR I%=0 TO dim%-1
750 rule%(I%)=EVAL(MID$(rule$,dim%-I%,1))
760 IF rule%(I%)>=S% VDU7:PRINT"invalid state ";rule%(I%);" in rule ";rule$:END
770 NEXT I%
780 PRINT "seed pattern"'"  RETURN for random,"'"  or string of numbers in range 0-";S%-1;"  : ":INPUT""seed$
790 IF seed$="" THEN rnd=TRUE ELSE rnd = FALSE
800 ENDPROC
810 :
820 DEF PROCinitrnd
830 FOR I%=0 TO M%
840 ?(c1%+I%)=RND(S%)-1
850 NEXT
860 ENDPROC
870 :
880 DEF PROCinitseed
890 FOR I%=0 TO M%
900 ?(c1%+I%)=0
910 NEXT
920 len%=LEN(seed$)
930 l2%=len%/2
940 start%=M%/2-l2%
950 end%=M%/2+l2%
960 IF len% MOD 2=0 THEN end%=end%-1
970 FOR I%=start% TO end%
980 ?(c1%+I%)=EVAL(MID$(seed$,I%-start%+1,1))
990 IF ?(c1%+I%)>=S% VDU7:PRINT"invalid state ";?(c1%+I%);" in seed pattern ";seed$:END
1000 NEXT
1010 ENDPROC
```

## November listings

*If you don't like typing, the easiest way to enter the listings is to buy the monthly listings disc. The disc is fully menu-driven and an excellent buy at only £5.95. The programs are also available on 3.5-inch disc for the Arc, Compact and Electron at £6.95. See the order form on page 115 for details.*

*Alternatively, the listings can also be downloaded from Micronet if you have a Micronet subscription.*

*The* Acorn User *software can be downloaded just like any other programs from Prestel. Go to the first page by entering *AUPROGS#. From there the operation is fully prompted. The charge for the software from Micronet is £5.00, so you can save money too.*

# TOP OF THE LIST

**Listing 1. Mode 1 screen dump for Hewlet Packard Laser print**

```
   10 REM Mode 1 LaserJe
t dump
   20 REM by David Lawre
nce
   30 REM for B/B+/M/C/E
   40 REM (c) Acorn User
 November 1988
   50 :
   60 MODE 1
   70 PROCdump
   80 PROCcheck
   90 REM Load picture h
ere.
  100 dummy=GET
  110 CALLdump
  120 END
  130 :
  140 DEF PROCdump
  150 base=&70:x=&72:pee
k=&73
  160 mask1=&75:times4=&
77:y=&78
  170 mask2=&79:flag=&7A
  180 byte=&7B
  190 oswrch=&FFEE
  200 :
  210 FOR I%=0 TO 2 STEP
 2
  220 P%=&900
  230 [OPT I%
  240 .dump
  250 LDA #2
  260 JSR oswrch
  270 LDY #0
  280 STY flag
  290 JSR send
  300 LDA #&78
  310 STA base
  320 LDA #&32
  330 STA base+1
  340 LDA #80
  350 STA x
  360 .xloop
  370 LDA #16
  380 STA mask1
  390 LDA #1
  400 STA mask2
  410 .mloop
  420 LDA #4
  430 STA times4
  440 .tloop
  450 LDA base
  460 STA peek
  470 LDA base+1
  480 STA peek+1
  490 LDY #line-init
  500 JSR send
  510 LDA #32
  520 STA y
  530 .yloop
  540 LDY #0
  550 .lloop
  560 LDX #0
  570 LDA (peek),Y
  580 PHA
  590 AND mask1
  600 BEQ nothigh
  610 INX:INX
  620 .nothigh
  630 PLA
  640 AND mask2
  650 BEQ notlow
  660 INX
  670 .notlow
  680 LDA &36F,X
  690 ASL A
  700 TAX
  710 LDA times4
  720 CMP #2
  730 BCC lowbits
  740 INX
  750 .lowbits
  760 LDA scales,X
  770 PHA
  780 LDA times4
  790 LSR A
  800 BCC highs
  810 PLA
  820 AND #&F
  830 JMP phew
  840 .highs
  850 PLA
  860 LSR A:LSR A:LSR A:
LSR A
  870 .phew
  880 JSR nibble
  890 INY
  900 CPY #8
  910 BNE lloop
  920 LDA peek
  930 CLC
  940 ADC #&80
  950 STA peek
  960 LDA peek+1
  970 ADC #2
  980 STA peek+1
  990 DEC y
 1000 BNE yloop
 1010 DEC times4
 1020 BNE tloop
 1030 ASL mask2
 1040 ASL mask1
 1050 BCC mloop
 1060 LDA base
 1070 SEC
 1080 SBC #8
 1090 STA base
 1100 LDA base+1
 1110 SBC #0
 1120 STA base+1
 1130 DEC x
 1140 BEQ finish
 1150 JMP xloop
 1160 .finish
 1170 LDY #done-init
 1180 JSR send
 1190 LDA #3
 1200 JSR oswrch
 1210 RTS
 1220 :
 1230 .nibble
 1240 PHA
 1250 LDA flag
 1260 EOR #1
 1270 STA flag
 1280 PLA
 1290 LDX flag
 1300 BEQ sendit
 1310 ASL A:ASL A:ASL A:
ASL A
 1320 STA byte
 1330 RTS
 1340 .sendit
 1350 ORA byte
 1360 .char
 1370 PHA
 1380 LDA #1
 1390 JSR oswrch
 1400 PLA
 1410 JMP oswrch
 1420 :
 1430 .send
 1440 LDA str,Y
 1450 BEQ sent
 1460 JSR char
 1470 INY
 1480 BNE send
 1490 .sent
 1500 RTS
 1510 :
 1520 .str
 1530 .init
 1540 OPT FNequs(CHR$27+
"E"+CHR$27+"*t300R"+CHR$
27+"*r1A"+CHR$0)
 1550 :
 1560 .line
 1570 OPT FNequs(CHR$27+
"*b128W"+CHR$0)
 1580 :
 1590 .done
 1600 OPT FNequs(CHR$27+
"*rB"+CHR$12+CHR$0)
 1610 :
 1620 .scales
 1630 OPT FNbin("1111111
111111111")
 1640 OPT FNbin("1011011
011011010")
 1650 OPT FNbin("0100100
100100101")
 1660 OPT FNbin("0000010
000000001")
 1670 OPT FNbin("0111111
111011111")
 1680 OPT FNbin("0101101
001011010")
 1690 OPT FNbin("0100000
101000001")
 1700 OPT FNbin("0000000
000000000")
 1710 ]
 1720 NEXT
 1730 ENDPROC
 1740 :
 1750 DEF FNbin(b$)
 1760 t=0
 1770 FOR p%=1 TO 16
 1780 t=t+(2^(16-p%))*VA
LMID$(b$,p%,1)
 1790 NEXT
 1800 ?P%=t MOD 256
 1810 P%?1=t DIV 256
 1820 P%=P%+2
 1830 =I%
 1840 :
 1850 DEF FNequs(b$)
 1860 $P%=b$
 1870 P%=P%+LEN(b$)
 1880 =I%
 1890 :
 1900 DEF PROCcheck
 1910 T%=0
 1920 FOR I%=&900 TO P%-
1
 1930 T%=T%+?I%
 1940 NEXT
 1950 IF T%=27365 ENDPRO
C
 1960 PRINT "Checksum er
ror."
 1970 END
```

# OFFERS

## TELETEXT RECEIVER

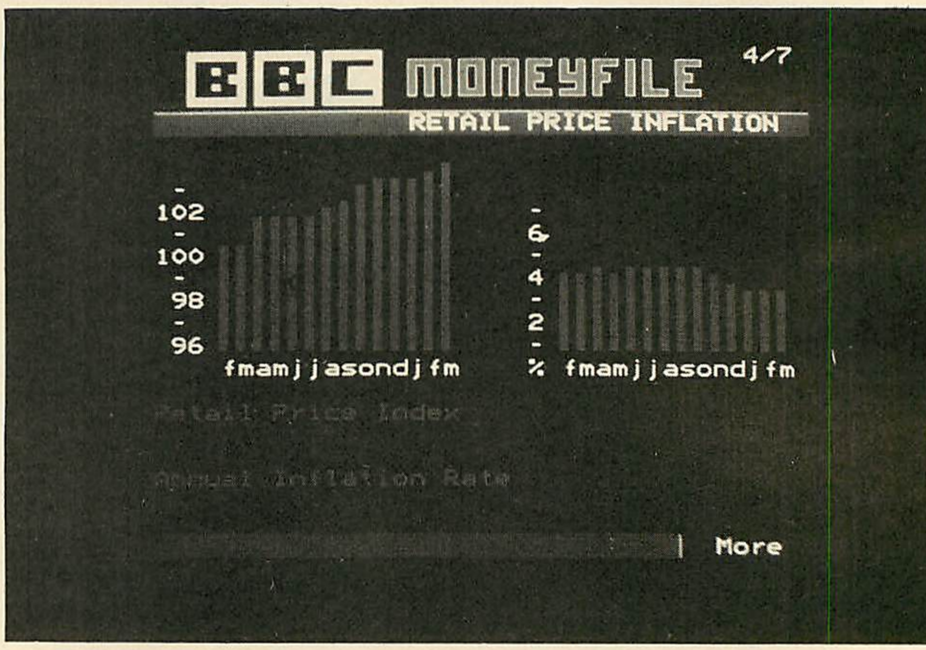
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Trying to fit together *Polyominoes* is as compulsive as *Space Invaders*. Once you have mastered that art, try to get four in a row with *Quadline*. Be lost and amazed in *Acorn User*'s very own maze game.

We have also included three of the most popular one line games from recent Abusers. Test your knowledge with *Mastermind* and start playing *Varpon* and *Lurch* to win. Make sure you get your disc of fun and entertainment and send off for the Games disc today. At only £8.95 it's a bargain not to be missed!

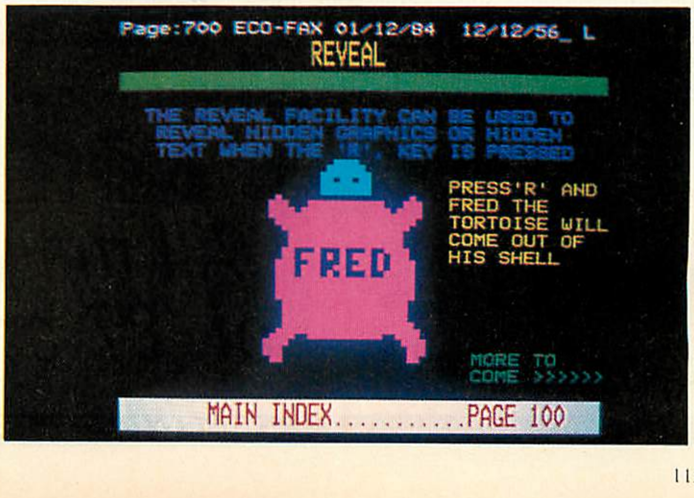
## EDUCATION DISC

# Easy learning with the Education disc

The *Acorn User* Education disc makes learning easy and enjoyable. The disc is packed with useful programs. You can have fun with our version of Turtle Logo. Graphics are a major feature of the disc and they include *Bulletin*, which converts your micro into an electronic message board. Strings of up to 255 characters can be screened in colourful sideways scrolling letters. Create screens with *Easyplot* and then use the two display programs *Vufoil* and *Noticeboard* to show them off.

There are also two screen dumping programs: an all-mode dumping routine for Epson-compatible printers and a teletext dumping routine which dumps in mode 7 to Epson FX80-compatible printers.

This disc comes in 40-track 5.25-inch format, but is easily transferred to 80-track and is yours for only £7.95.



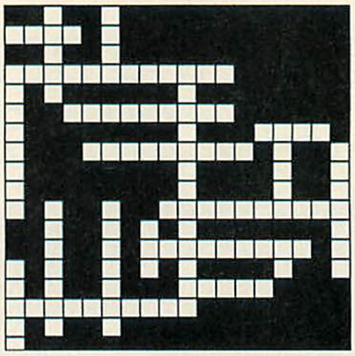
# OFFERS

## THIS MONTH'S LISTINGS

Joe has come up with the perfect program to dispel the winter blues – a crossword generator. Start designing and creating your very own crosswords and challenge your friends with them.

Also on the disc is the *Life* program, a simulation of a one-dimensional cellular-automa, ie, an amoeba. Watch the life process from birth to death.

Among this month's Hints and Tips there is a graphic memory map, which



shows how all your memory is being used, plus a date-stamp for *WordWise Plus* – all your documents will be automatically dated. There is also a one-line function proceeder lister and a routine to double the width of your letters.

Among the Agora programs on the disc is a demonstration of the 256-colour palette. The November disc comes in 5.25-inch format for £5.95 and 3.5-inch format for just £6.95.

### *Crossword mania has hit Acorn User discs*

## DISCS AND BINDERS

For the first time owners of an Archimedes or Compact can guarantee the priority delivery of their 3.5-inch listings discs for only £55 a year. Those of you with 5.25-inch disc drives can still take advantage of our special £40 subscription offer. If you buy both *Acorn User* magazine and the *Acorn User* 5.25-inch monthly discs then you can save an additional £7.50 by subscribing to both for a mere £50.

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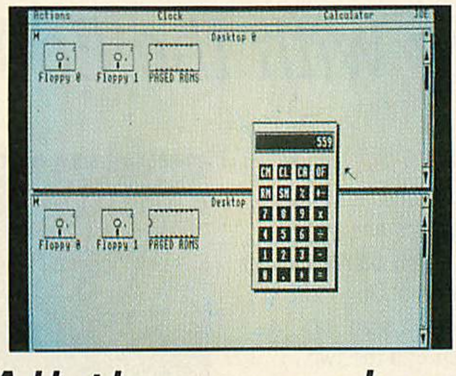


## '87 COMPILATION DISC

*Acorn User* has put all your favourite programs, routines and utilities from 1987 on one disc.

Featured are: Kiddie Art; Tapestry; PCB by CAD; Autumn and Theme, our music programs from April '87. Also on the disc is Joe Telford's GEM-like front end for the Master including a desktop calendar and year planner.

Other useful utilities include a proportional screen dump, a *View* printer




driver generator, a monitor-testing routine and a routine for printing spreadsheets sideways.

The second half of the disc is devoted to graphics, with a video image enhancer and six of the best Graphics Bonuses.

The *Acorn User* '87 Compilation disc comes in 5.25-inch 80-track format, with a comprehensive manual which includes all function key strips and instructions needed for the programs.

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# Archimedes Games

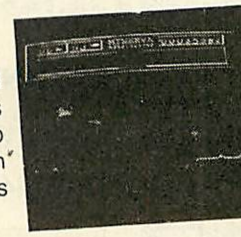
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## ORION

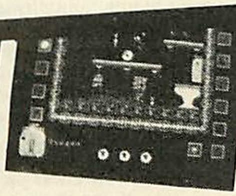
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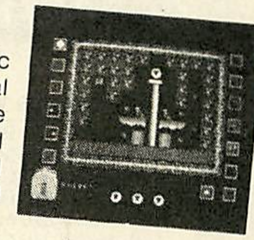
Skillfully manipulate Orion, the latest air to air combat interceptor, to defend your planet against the tide of marauding aliens. Shoot them down before its too late! Score points by saving your men before they are changed into mutants - otherwise they will turn against you. Contains Baiters, Pods which explode into Swarmers and waves of Bombers. Orion is a fast and furious scrolling 'shoot em up' game based on the all time arcade classic.



## HOVERBOD



Hoverbod is a traditional maze adventure in the style of the classic Manic Miner, yet it is of stupendous proportions. Hoverbod, the yellow sperical droid, has been banished from the planet Zingle and goes in search of some stolen treasure. The player must guide him through the perils which befall him and help him puzzle his way through the eight different levels to the final quest level. But beware ... the Ibbles and Squibbles start to materialise !!!!

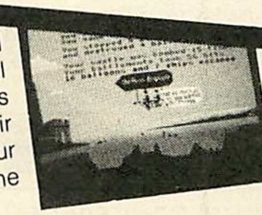


## FREDDY'S FOLLY

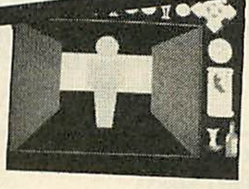
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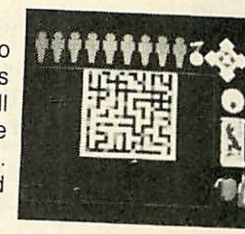
An enchanting game using animated graphics. Just watch the little men load the canon and pull it along. Notice the celebration when they win! Colourful fun for all the family. Sir Freddy is sneaky and envious of your castle so plans to bomb it with a fleet of balloons. You built a battlement to shoot down Sir Freddy in his balloon. Sir Freddy then hired several Gun ships to shoot your canon crew. Defend your castle and shoot down the balloons and the invading ships.



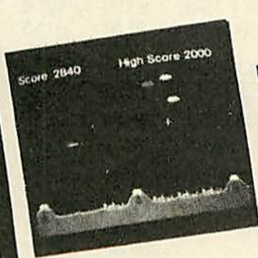
## MINOTAUR



The Minotaur maze game is aimed at a market for children or adults who want a game where quick shoot-out reactions are not necessary. Theseus walks around the Labyrinth, collecting items to assist in the search of the ill fated men which have been provided as food for the Minotaur. The ultimate aim is then to kill the Minotaur and lead the men out of the Labyrinth to safety. The maze size is fully definable by the User. Games may be saved and reloaded for use at a later time.



## MISSILE CONTROL




Missile Control is a classic arcade game written for the Archimedes to make full use of the advanced graphics and sound, while remaining faithful to the original concepts of the game. The Player is in control of the missile launches and must do the utmost to protect the cities from the incoming missiles. On each subsequent attack further planes, satellites or 'smart' missiles attack the target cities.



Please send me: ORION☐ HOVERBOD☐ FREDDY'S FOLLY☐
MINOTAUR☐ MISSILE CONTROL☐
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No.........................................
Name.....................................
Address...................................
Signed.....................................

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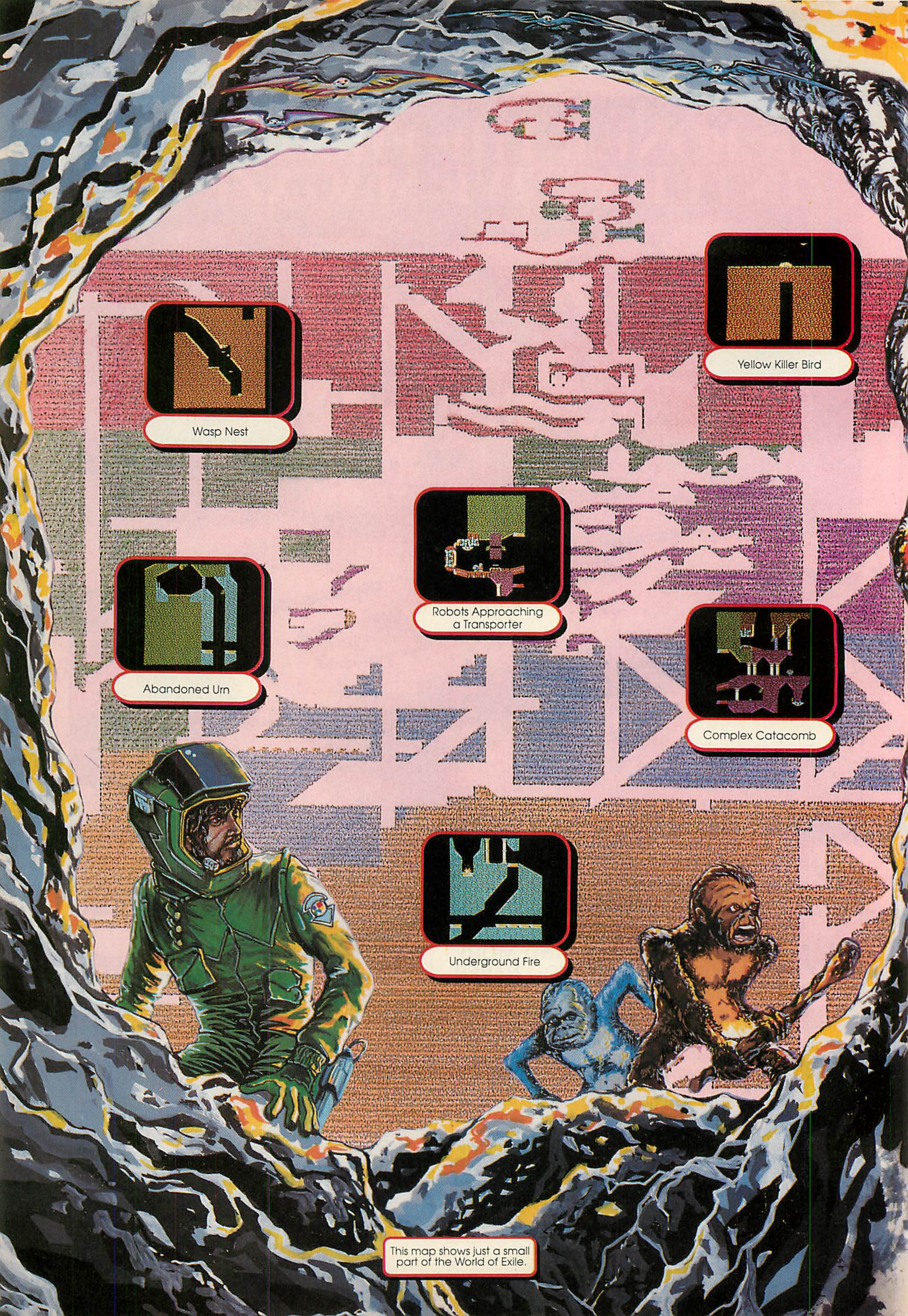
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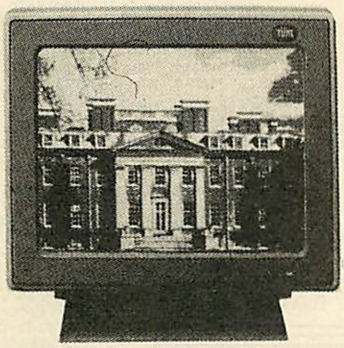
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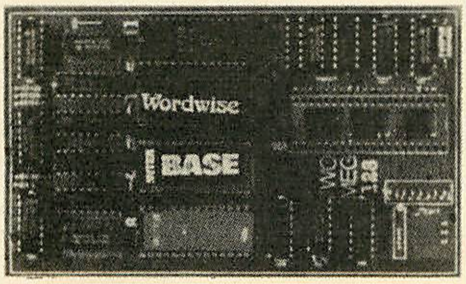
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# REVIEWS

## THE GAMES PAGE

# COUNTDOWN TO CHRISTMAS

**Sam Greenhill reports on how the software houses are gearing up to part you from your money over the festive season**

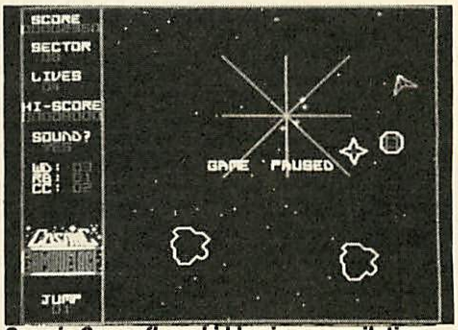
The games scene appears to have fallen into silence. Now the summer rush is over, the games companies are saving their energy for an onslaught of Christmas releases, and leaving us to amuse ourselves. But although not many new games are in the shops, they aren't far off, and a few software houses have spilled the beans.

It had to happen sooner or later. Just after the Arc's first birthday, Repton stakes its claim to the 32-bit machine. The Arc-Repton will contain all the screens from the original *Repton 3, Around the World, Life of Repton* and *Repton Thru Time* – a total of 144! Some say the absurd immortality of Repton has gone too far, but Superior's Richard Hanson is convinced the game will sell just as well as it always has done.

If there's one other game that has had as many sequels as *Repton,* it's *Breakout.* Again Superior is the bottom line, and it's having a bash at the now familiar bat 'n' ball formula – after all everyone else has. To be called *Brixx,* it ought to be around in time for Christmas and will be available only for the Archimedes.

We can expect one other Arc game from the company in the near future – *Deliverer.* It's a shoot-em-up cross between *Elite* and *Space Invaders* using 3-D vector graphics. If I were to choose, I would associate *Deliver* more with the former, but it won't be nearly as complex.

Sometime between now and the biggie for 1989, *Exile,* will be another compilation of four games for the 8-bit beeb and Elk. Following the example set by *Play it Again Sam 3, Sam 4* will only include two of the company's own titles; *Grand Prix Construction Set* and *Spellbinder.* The Electron version replaces *Grand Prix* with *Guardian.* The third game is the very popular *Frak!* Number four is a new game, called *Cosmic Camouflage* – a sort of *Super Meteors.* In fact Superior is working on a whole set of compilations for the future, but it won't necessarily have written the games itself. The idea is for the Superior label to market games from other companies that never quite made it.




***Cosmic Camouflage*: hidden in a compilation**

Superior has also leaked its plans for a boxing simulation in which you can cheat if the referee isn't looking!

On the subject of compilations Audiogenic is preparing for Christmas four of its most popular games bundled into one package, to be called *Fab Four.* The package will include a revised version of *Sphere of Destiny* (hopefully a bit easier to play), plus *Psycastria* with new screens. The company's Peter Calver claims they are all full-price 'strong' titles – certainly not to be sniffed at.

Rainbird, a subsidiary of Telecomsoft, is working on a couple of games for the Archimedes to follow up *Corruption,* its yuppie 'adventure.' One that sounds the most interesting (and humorous) is *Fish* from Magnetic Scrolls. It isn't yet certain that the game will be released, but if it is, the idea is that you – a goldfish – are trapped in a glass bowl. Perhaps the object is for you to provoke the cat into knocking over the bowl?

As promised last month, here's the full set of passwords for *Repton Thru Time* – from Andrew Pepperell of Lincolnshire.

| Screen | Password |
|---|---|
| 1A | PREHIST |
| 1B | HEATERS |
| 1C | HILLOCK |
| 1D | PILFERS |
| 1E | MEDIATE |
| 1F | COMPACT |
| 1G | CARTOON |
| 1H | TABULAR |
| 2A | EYGPT |
| 2B | FAVOURS |
| 2C | HAPPENS |
| 2D | PERSONS |
| 2E | CONQUER |
| 2F | EVENING |
| 2G | MASTERS |
| 2H | PIMPLES |
| 3A | VICTORI |
| 3B | MERCURY |
| 3C | CLEAVER |
| 3D | BINDERS |
| 3E | CONFUSE |
| 3F | JINGLES |
| 3G | DOLPHIN |
| 3H | MINSTER |
| 4A | NOW |
| 4B | OCTAGON |
| 4C | CASTLES |
| 4D | CHARLES |
| 4E | GREATER |
| 4F | BOOKLET |
| 4G | FUNTIME |
| 4H | SAVOURS |
| 5A | FUTURE |
| 5B | ORACLES |
| 5C | STAPLER |
| 5D | DANCING |
| 5E | FANCIER |
| 5F | BANANAS |
| 5G | EVEREST |
| 5H | KINGDOM |

**All the passwords for *Repton Thru Time***

# REVIEWS

## GAMES

### MOON WALKING



**Pipeline; Superior Software, BBC and Electron cassette, £9.95, 5.25-inch disc, £11.95, 3.5-inch disc, £14.95.**

Take *Codename: Droid* and *Ravenskull*, and you get *Pipeline*. It's set on Io, Jupiter's fiery moon, where you must collect sulphur drums from the disaster-struck mines. The game is an arcade adventure – *Ravenskull*-style – written by two 15-year-olds, Ian Holmes and William Reeve.

Loading the game was a slight problem. Only after I stripped my machine of every ROM except Basic and DFS did it run.

Once down the mines you stroll around collecting sulphur, avoiding monsters and fires. You can pick up objects for use, throw or drop them.

To complete the game, you must execute a mission, a bit like *Droid*. Each level is pretty large, and could take a long time to finish. Of course there are also the famous pipes to contend with. Once you enter a pipe you have reached the point of no return, and you are whisked along a predefined course and deposited at the other end – a bit like *Repton's* transporters but more 'graphic'. *Pipeline* incorporates a mass of puzzles to grapple with, including teleports, remote control units and 'space burgers' – a puzzle in itself. Finally you must find the control robot (the finishing sprite) and pick it up.

*Pipeline* has the facility to redesign almost everything. You design the sprites, the keys, the screens, the mission, even the puzzles. The level designer is extremely comprehensive, allowing an enormous number of flags to be set per puzzle. So, you could set up a puzzle wherein you can't reach a crucial 'collectable' until you've found the Jovian wine and used it to put out the fire near the door! But you can't tell whether your puzzles work until you've entered the game – a process taking a fair amount of time, too many loader screens and four disc changes.

Graphically *Pipeline* is good. There are two things that let the game down – only slightly. First, the sound is only adequate and second, the company appears to have been a bit tight-fisted over the instruction sheet. *Pipeline* requires you to read a lot of small print. I'm sure a small booklet could resolve the problem.

There's no doubt in my mind that *Pipeline* is a great game. I recommend you rush out and buy it immediately.

**Sam Greenhill**

### THE SECOND STRIKE

**The Empire Strikes Back; Domark, BBC cassette, £9.95, or disc, £11.95.**

In this, the second in the *Star Wars* trilogy, Luke Skywalker finds himself on the ice planet of Hoth, battling against Darth Vader's evil Empire. In the first stage, you fly around in your snowspeeder destroying all the probots in your path. From there, you move on to fight the AT-ATs, fly through space avoiding giant asteroids, and then, finally, onto the last level where you must seek out and destroy the great giant asteroid itself.

Like the first game in the series, *The Empire Strikes Back* uses wire frame graphics to good effect. Although a little slow, the animation is smooth and the perspective works very well. The giant walkers, a memorable sight in the film, are particularly well portrayed. As in the film, the only way of killing them is by launching a kind of giant bolas at their legs, sending them crashing to the ground.

I enjoyed *The Empire Strikes Back*; I found it fun and addictive. Unlike many games these days, it has enough action and gameplay to make you want to come back to it time after time. The now traditional £9.95 asking price is, I think, fair enough for such a good game.

**Rob Miller**

### ALL EYES TO EARTH




**Terramex; Grand Slam, Arc 3.5-inch disc, £19.95.**

Yet again the world is doomed. Only Professor Eyestrain can save us!

*Terramex* puts you in the role of one of five explorers armed only with a line of invisible pygmies to carry all the objects you collect. It is your task in this game to find Professor Eyestrain and persuade him to save the Earth.

Your own character can be controlled by keyboard or mouse. He can move left and right, climb ropes and ladders and jump up slopes. This is one feature that annoyed me – you can move down slopes simply by walking, but you have to jump up them. Apart from this, movement is good and keyboard response is fast.

To complete your quest, you'll have to pick up and use most of the objects dotted about the 50-odd screens. Some of these are used to get past the puzzles in the game, others must be given to Eyestrain so he can make the asteroid deflector.

Graphically the game is excellent, background scenery is varied and detailed, with nice touches such as the bones of hapless explorers. Your character is also very nicely animated, especially when you ask him to think!

The sound in *Terramex* is much better than in any Arc game I've played so far; good effects and a stereo backing tune. If all this was not enough, you can also play the game in 'fast' mode (which is about four times faster!).

Overall, the game is very good, if a bit easy. It should give you something to do in these long winter evenings. Let's hope we see more ST and Amiga games migrating to the Archimedes.

**Dave Lawrence**

# EXILED IN SPACE

**Dave Lawrence was lucky enough to have first shot at the latest adventure from Superior – and found it's a must**

When a game comes complete with a novella to describe the scenario, you know it must be something special. Superior Software's latest release, *Exile*, is one such game. It is set on the hostile planet of Phoebus, where the crew of the landing craft, Pericles, have been subdued by the evil professor Triax. You must try and rescue them.

*Exile* is an 'arcade adventure', and seems to draw ideas from a number of previous BBC games.

The game runs fine on an unexpanded model B, but is greatly enhanced by adding one bank of sideways RAM: The enhanced version also works on a Master.

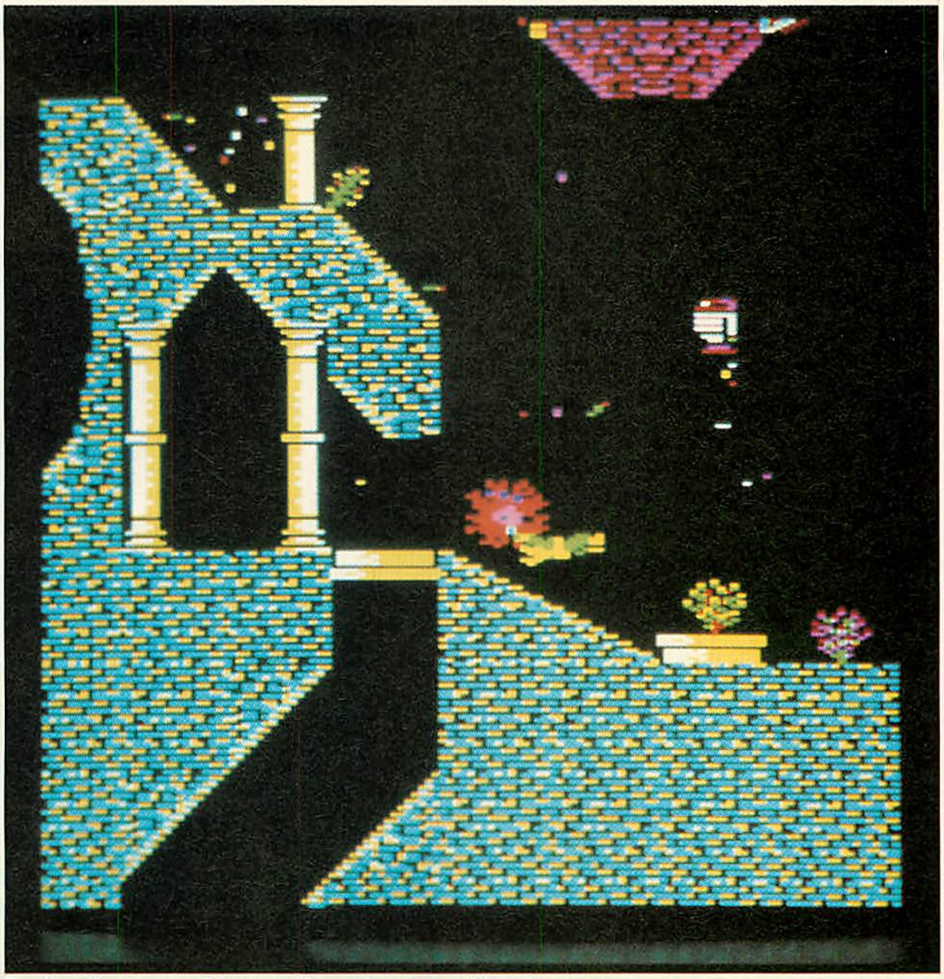
The action starts with your spacecraft in geostationary orbit above the stricken Pericles. You must work out how to get out of the airlock (not difficult) and then find a path to the planet's interior.

Once inside you need to spend some time exploring and getting used to the control keys. This is quite tricky at first, but after a while you get the hang of it and it's great fun zooming around with your jet-pack. Besides flying around, you can walk or even crawl.

You are unequipped initially, apart from the jet-pack, so it's essential to arm yourself against the hordes of roving nasties. These come at you in several forms. First you'll be buffeted by harmless birds and mischievous imps, but later you'll be attacked by poisonous bees, vicious birds and even the robotic crew of the Pericles!

Avoiding (or shooting) the inhabitants of Phoebus is really only a side-line; there are numerous puzzles to solve and there isn't just one way to succeed. Opening the door at the start is relatively easy, but later on there are fires to deal with, doors to open, turrets to shoot, transporters, secret passages, friendly robots, magic mushrooms and the dreaded windy shaft!

*Exile* does not feature lives in the normal way, because you never actually die! Instead you are teleported away at the last second. You can 'remember' up to four teleport positions, so when you reach a safe place, it's advisable to 'remember' that place. The positions are stored on a stack – you go to the last one and when all four are used you are returned to your ship.



Gravity affects everything – so if you shoot something, it moves

The game is graphically very pretty. The scenery is large and detailed, especially the two spacecraft. The scrolling is not smooth, but acceptable. Sprites are rather on the small side, but charmingly animated. The bees and birds fly about very convincingly. The imps run around, throw things at you, then hide in their flowerpot! Little worms ooze out of the ground to crawl about and the intelligent robots chase you with their jet-packs.

The use of sound is well done; with most things bleeping (or talking with the enhanced version) in some way. One oddity is that if you pause the game while a sound is playing the effect pauses as well.

I liked many aspects of the game: its attention to detail; the windtunnel-like dust effects in the windy areas; the water bubbling in the flask; the sparks in the fires; the beehives and the birds' nests; and being able to aim your gun at any angle.

There is a save game facility that again, due to memory problems, is slightly strange – you press Shift f9, then CTRL-Break and reboot the disc!

I did find the game frustrating in places, but I found it great fun to play – I'm certainly going to try and finish it sometime. *Exile* is certainly a contender for the best Beeb arcade adventure for a long time. It's definitely the best game this year.

# DRAWING THE LINE

**Two more packages have entered the computer-aided design market. We've been taking a look at what they can do**

***Alan Harding and Mike Hayward***

With hard copy devices becoming more sophisticated, there is an increasing demand for high-quality graphics software. Fast operation, precision, quality hardcopy, ease of use, and a good range of drawing 'tools' are the features required, not an easy group of requirements for any micro. This is the market that *TechnoCAD* and *AutoSketch* have entered.

There is now quite an extensive range of graphics programs available for BBC micros. They vary from the highly sophisticated packages like *Bitstik*, *Compas Advanced* and *Techsoft Designer* (precision packages priced from £2 to £700) to the more simple paint programs like AMS *SuperArt* priced around £40.

Until recently, if you wanted an accurate plot rather than a print-out, then the program was likely to be expensive. Not so now with the hybrid programs such as *AMS Design, Diagram II* and *Novacad* costing £50 or more.

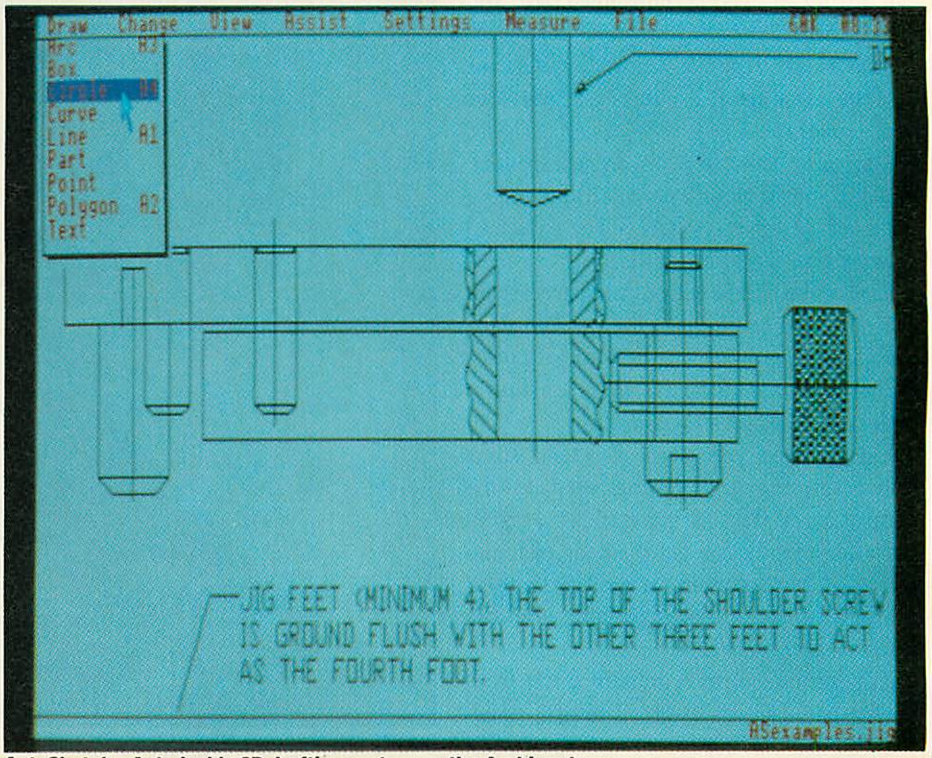
In addition, there is quite a market within education for programs which perform a specific task very well, without covering a vast range of facilities. Here you find some real bargains, few are priced above £30: geometric programs, 3D modellers, some with advanced features such as auto-dimensioning and hatching, even pattern development for tapestry, all aiming to fulfil a specific need.

## TechnoCAD – for the Master

*TechnoCAD* is an ADFS-based program for the Master series micros. It has a pedigree – Technomatic's *Novacad* is now several years old. The range of facilities in *TechnoCAD* is extensive, and they are all easy to access: there is support for a variety of plotters, an accurate screen dump, and an uncluttered screen during drawing. The drawing tools are available from a pop-up menu at the touch of a button. All this makes this package worth investigating.

*TechnoCAD* aims to be an accurate and fast graphics program. Speed is assured by keeping the evolving drawing and program in memory for instant access, and accuracy is set by scaling the screen. The result is a package which is much faster and more precise than screen paint programs.

CAD programs store drawing information as a series of co-ordinate points which are then given various styles of connections (line types). This produces a very precise and flexible drawing program which lends itself to manipulation. Screen paint programs generally produce graphics by controlling each screen pixel – images are formed by colouring areas of pixels. You can only recall the image as a whole picture. The difference is important – you could double the size of a vector drawing without reducing the resolution, but if you double the size of a painted image, all the pixels grow. One pixel is changed into a block of four, so the picture gets 'chunkier'.




***AutoSketch* – Autodesk's 2D drafting system on the Archimedes**

CAD drawings need to be stored in memory as a series of vector instructions so that they can be later edited. Painting programs don't record the sequence of operations that created the image. They just store the picture. Vector-based programs store the whole sequence of operations needed to draw the image so that they can draw or redraw the image at different scales.

*TechnoCAD* makes the most of available memory in two ways. First, it reduces the size of each drawing by encouraging the extensive use of icons. This means that the detail required for the icon needs to be stored only once. Second, the drawing information is stored in sideways RAM.

*TechnoCAD* presents two choices after 'booting' up, the drawing program and a 'toolkit' option. The toolkit allows installation of the hardware and customisation of the drawing options. It is impressive, covering things like input device (keyboard, mouse or trackerball), printer and plotter types or use of an external plotter driver for

those not supported. In all there are some 20 selections, all with subsidiary choices.

The drawing program presents a simple four-choice menu: Old diagram, New diagram which prompts for a filename, Load diagram which recalls diagrams saved to disc, and List diagrams which catalogues the disc. The first option is used because *TechnoCAD* uses all four sideways RAM slots for storing the evolving diagram. Consequently the diagram is preserved even after the Break key is pressed – drawing can be interrupted in order to carry out other tasks, and the diagram recalled from sideways RAM later.

Diagrams are produced on a clear screen with a simple border, the only information being the cursor cross, its co-ordinates (outside the border at the top), and information relevant to current activity (outside the border at the bottom). The screen is a 'window' which can be panned over a large page (up to 841 x 1189mm in real-world measurements). There are three working colours and a background colour.

To put *TechnoCAD* to the test, an electronic circuit was drawn. It involved the production of an icon set and 'sub-assemblies'. The icon set is shown in figure 2. All were drawn on the same page.

Forming an icon is carried out by setting a box cursor around the desired part of the drawing and adjusting its size to suit the area. Icons are stored in memory and can also be saved to disc if required.

Electronic schematics are a convenient test of this type of package because the basic icon set can quickly be used to construct more complicated icons; figure 3 shows two such units. The final circuit, figure 1, is an assembly of icons connected together by simple lines, easily achieved by using the snap grid to connect them all together. Accurate connections and details can be drawn with the zoom option which has a range between 0.05:1 and 20:1.

Producing icon sets and using them is a simple task which is supported by a good range of tools: changing scale, rotating and so on are simple. The set-up features such as grid spacing, line thickness and so on can also be altered to suit. One quickly becomes adept at moving through the selections, making changes as the need arises.

With the icons formed, the next task is to make them into a 'key' file. These files are attributed to the function keys. Thirty-eight icons at a time can be assigned to the keys using the Shift, CTRL and Shift plus CTRL keys with each key, and the set can be changed while drawing if required. The f0 and Shift-f0 keys are reserved for calling the last icon used and for calling an icon by name – very useful when repeats are required. Once you have completed the formation of a key file, a key strip is easily produced on a printer.

In addition to drawing on a single sheet, diagrams may be constructed on up to eight layers, in effect a sandwich of drawings. This allows each diagram in a series to have correct registration while having a separate identity, so that it could be plotted on a different sheet or in a different colour. Examples of use might be the production of multi-layer overhead slides, or a base drawing with different text on subsequent layers.

*TechnoCAD* has a number of limitations. The first concerns resolution – the finest drawing distance that can be set is 0.1mm. This has knock-on effects when attempting to draw arcs to particular angles. Of course resolution is no problem for sketches, but it is a problem for any drawings that require geometric formations like tangents, bisections and any line, arc or point of intersection which should terminate between these 0.1mm grid points. A second limitation concerns the drawing tools available; lines, arcs, circles and text only. Line types or styles (like dotted lines) are surely an important omission. Of course these can be constructed as icons, but it is unnecessarily difficult. There are also no hatching or fill routines and no auto-dimensioning.

The edit or modify features are good, and as with all selections, they are fast. Lines, arcs, circles, icons and text can be selected and modified in a number of ways such as moving (in the case of lines either the whole entity or each end) and deleting. Thickness and colour can also be changed.

*TechnoCAD*'s speed and range of support facilities are enough to suggest that it will be a useful working CAD package. But it can only be used on the Master series – the educational field is expected to be its main market. How will they use it? Probably any task where schematic arrangements or stylised drawings are required: flow charts and electronics spring to mind, although all science subjects including design technology have such applications. Small businesses would also benefit with schematic applications, but you should bear in mind the limited geometric drawing.

The package comes with a fairly comprehensive manual which contains a number of tutorials (although I only saw a draft). It does revert to jargon at times, which might upset a novice. In this respect it is worth considering that the micro is moving from the province of the computer buff into that where it will be used as a tool. *TechnoCAD* is a good tool, but priced at around £140 it does appear a little expensive.

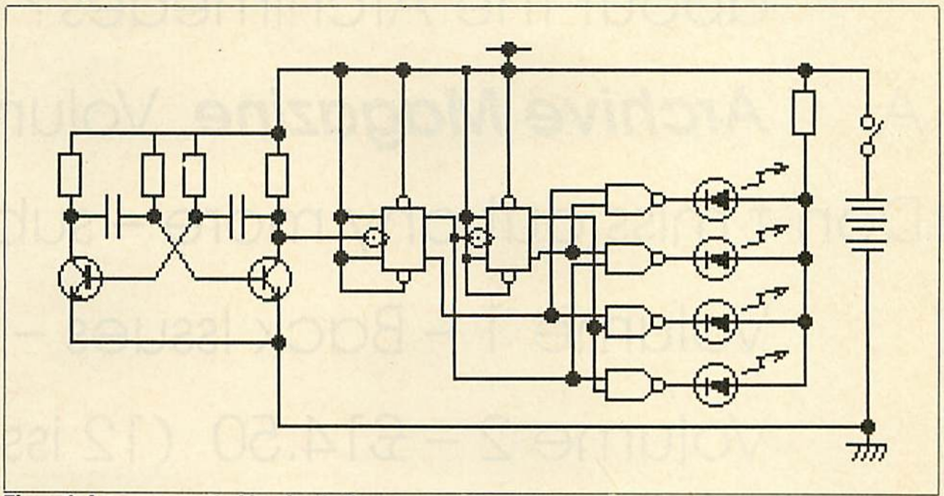


**Figure1. Icons connected by simple lines**

## AutoSketch – for the Archimedes

Having used *AutoCAD* for drawing work in industry, I was more than impressed with Autodesk's *AutoSketch* for the Archimedes, both with the speed with which you could draw, and with the overall size and complexity of the drawings that this new Archimedes drafting program is able to cope with.

It has all the basic draw, edit and view commands of a professional drafting system such as *AutoCAD* plus one or two that I've often wished would be included in an improved version. I soon got the hang of *AutoSketch*, by trying each of the options in turn and using each of the items in the pull-down menus. In most cases everything became clear after a quick look at the manual. But I've found that manuals for users of CAD software are notoriously poor, often giving a description of a function without telling you exactly what you

should use it for – the *AutoSketch* manual is, I'm afraid, no exception.

Installing the *AutoSketch* files and configuring it for the correct peripheral devices is no problem – there's a special installation guide. *AutoSketch* really requires either a normal colour monitor or one of the multisync screens to allow you to use the higher resolution modes. The size and complexity of the drawings possible is limited by the amount of RAM present in your computer. Plots and print-outs can be achieved through a variety of devices, ranging from Epson and IBM-compatible dot-matrix printers through to Roland plotters, Hewlett-Packard plotters and laser printers.

To the CAD novice, the *AutoSketch* screen may seem a bit daunting, but once a few menu options have been selected, you'll see that they pull down into friendlier-looking lists. Any beginner should concentrate on the Draw, Change and View menus, drawing lines, boxes and circles, editing them and zooming and panning the screen (shifting the view of the drawing or enlarging it so you can work on the detail of a small part of it). This should help you in getting used to the mouse for drawing. Most of the commands are self-explanatory, especially with the help of the prompts on the bottom line of the display.

One rather puzzling command when you first use it is Curve. When you try and draw a curve, what you get is a 'frame' of control points connected by straight lines. When the Curve command is completed, a smooth Bezier spline curve is drawn, passing through the first and last points, with the curve pulled in the direction of the other two control points. But the frame remains displayed. It cannot be edited, and the Erase command won't get rid of it. The answer is to be found in the shape of the Frame command under the Assist menu. This toggles the display of the frame on and off.

Group is an extremely useful command. It can be used to group together parts of an object – lines, curves, boxes and so on – together into a single compound object, so they become a single entity. This means that when moving or copying, only one element of a group needs to be selected in order to capture the whole group. It is possible to create a group of grouped objects, and grouping can be 'nested' up to eight levels deep. The Ungroup command reverses the process so a group reverts to a set of independent entities again.

When you've got the hang of drawing, editing and zooming in and out, it's time to explore commands that make drawing easier. Grid and Snap give precision when drawing things that have to be of an exact regular size if you're not using the keyboard for co-ordinate entry. I suggest setting up a grid of dots every time you start a drawing, spacing them at five or 10 drawing units. Coupled with a snap setting of say one unit, this will help ensure that the ends of lines do actually meet, giving more accurate results. Say you wanted to draw 10 circles, with a pitch (distance between their centres) of five units. With no snap spacing, this is very tricky, but with a snap spacing of five units it is easy, as the cursor will always lock onto points at exactly the right pitch. Snap works both horizontally and vertically. Both Snap and Grid can be switched on and off with the Assist menu, and the distances can be adjusted with the Settings menu.

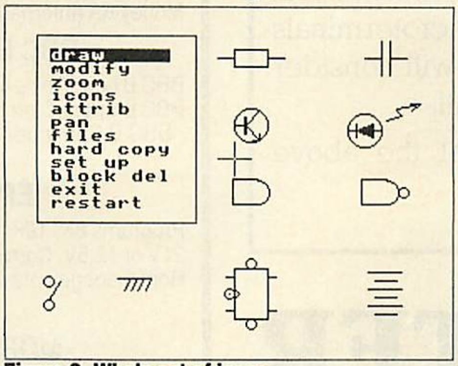



**Figure 2. Whole set of icons**

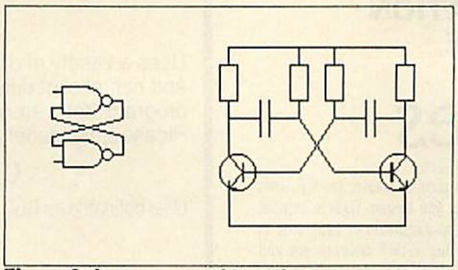


**Figure 3. Icons grouped together**

As a shortcut in *AutoSketch*, pressing the function keys brings up many of the more frequently used commands, without having to go through the menus. For example, pressing f1 gives you Undo, while pressing Shift-Alt-f1 gives you Line. One of the features that *AutoSketch* has had for some time is 'associative dimensioning'. That is when a dimension is stretched, or a component's size is increased, the distance is remeasured and the text attached to the component is automatically changed. This is very handy, and saves having to retype all the dimensioning information if you change the size of a component.

There are 10 available drawing layers on *AutoSketch* drawings. These are best described as transparent overlays, each with a different part of the drawing on them. Parts of a drawing can be on different layers, in different colours if required, so that any layer can be viewed or plotted on its own or in any combination with other layers.

*AutoSketch* also has two features that will be of interest to anybody who may be able to use *AutoCAD* in the future for drawing work. If your application outgrows *AutoSketch*, you can use the Make DXF command to make a special DXF file of your drawing, so you can load it into *AutoCAD* and use its features to improve your drawing. A DXF file is in a special format, Drawing Exchange Format, that can be understood by many professional CAD packages. A DXF file is usually given the same name as the drawing file, but it is stored in the DXF directory, whereas the main drawing files are kept in the SKD directory. Sprite files can also be created, so drawings can be loaded into other Arc applications and then, if required, be used independently of *AutoSketch*.

Import IBM performs the same sort of function but in reverse – a read DXF in effect. It allows you to import files from MS DOS versions of *AutoSketch*, *AutoCAD* or other CAD packages. However, owing to limitations of *AutoSketch*, some drawing constructs such as splines won't be imported properly. Other versions of *AutoSketch* (on MS DOS machines) don't have this Read DXF ability at all.

A final word about plotting; it's here that you can specify what units you want your drawing to be plotted in. Commands involving selecting pen colours and speeds, paper sizes and scaling are fairly simple, and they should be adjusted to suit your application, plotter or printer.

The Arc version of *AutoSketch* does not lack any major requirement for its intended application. I would like to have seen more flexible dimensioning and an easier way of making multiple copies of something, rather than grouping them. A cross-hatching ability would be nice – lines at a user-definable spacing and angle would suffice.

But aside from these minor points, *AutoSketch* is more than adequate at handling most sorts of drawings. It is as at home drawing house extensions as graphs and technical illustrations. If you possess an Archimedes and you're curious about CAD, then you should be seriously interested in *AutoSketch*.

AutoSketch; £91 *from Autodesk, Southbank Technopark, 90 London Road, London SE1 6LN.* TechnoCAD; *around £140 from Technomatic, 17 Burnley Road, London NW10 1ED.*

# COPING WITH NUMBERS

**Charts and graphs make understanding reams of numbers much easier. Peter Sandford looks at two packages that can help you transform boring old numbers**

Confront the average person with a solid page of numbers and the chances are that you'll be met with a glazed expression and evidence that you've discovered an infallible cure for insomnia. Convert those statistics into a series of colourful charts and diagrams and you stand a much greater chance of getting your message across.

When the BBC micro was released, several software houses recognised its potential as a means of presenting information in graphical form. Packages such as *ViewPlot, InterChart,* and even *Acorn User*'s own *ViewChart,* have all been used widely in homes, business and education. They translate data extracted from databases and spreadsheets into barcharts, piecharts or other forms of graph.

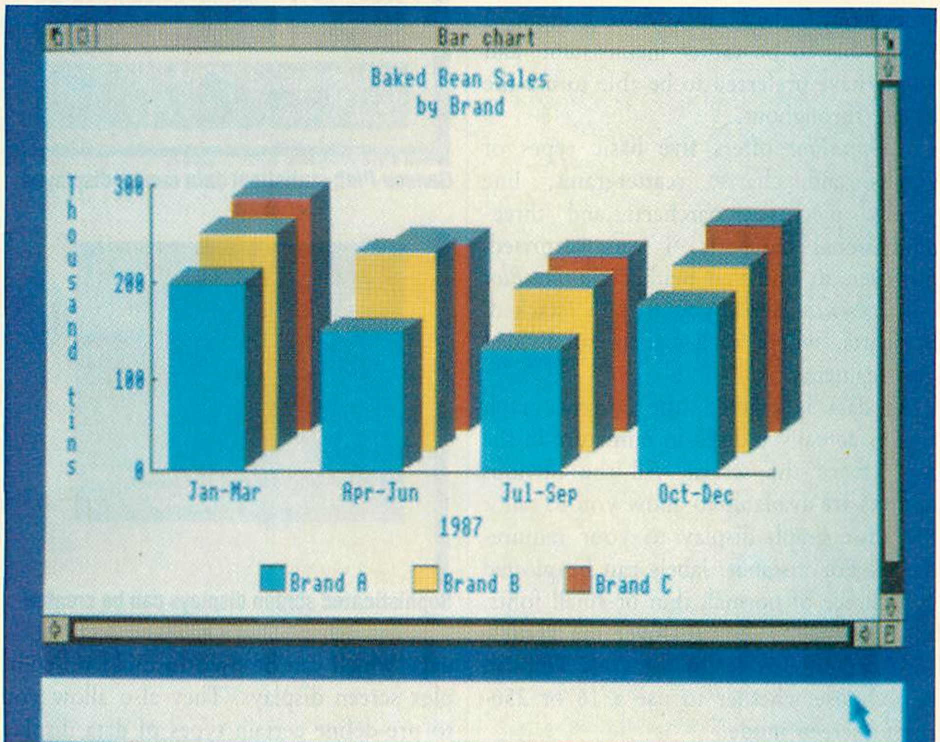
Two new pieces of Archimedes software aim to exploit the advanced graphics capabilities of the new machine for a similar purpose. *Presenter* from Lingenuity makes full use of Arthur's WIMP environment to provide an easy-to-use package. *GammaPlot,* from Minerva, is a more ambitious package which exploits the Archimedes' graphics to the full.

Both packages enable you to enter and edit data manually, or to read it in from an external database or spreadsheet. Once entered, the data can be plotted in a variety of forms, and you can swap instantly from say, a piechart to a barchart or a line graph, to find the best way to present the data.

I was pleased to find that both packages come complete with their own demonstration datafiles, which proves invaluable for learning to use the software.

As mentioned earlier, *Presenter* makes use of the built-in WIMP environment of the Archimedes. Having used *First Word Plus* extensively, I found it very easy to familiarise myself with *Presenter*'s system of pop-up menus. I found I could access most of the options, without recourse to the manual, after a very short time indeed.

Data is entered into a straightforward 'spreadsheet' type of display. Menu options allow you to select automatic horizontal or vertical movement of the cell cursor, if required. Data can be edited with a series of mouse-controlled commands, allowing you to cut, paste, insert, and delete individual rows and columns.




***Prestenter*, bar chart menu allows you to select an attractive three-dimensional display**

Having entered your data, you can choose to plot it in the form of either a barchart, piechart or line graph. Each type of graph offers a further menu, allowing you to control details such as the positioning of legends and choice of screen colours. The barchart menu also allows you to select a three-dimensional bar display which is particularly attractive. These options are saved to disc with the data.

Three types of printer are supported by *Presenter;* Epson FX and compatibles, Integrex 132 colour printers, and Plotmate A4SM and A3M colour plotters. Data can be imported from spreadsheets and databases, but must be in CSV (comma separated value) Ascii format – lists of numbers separated by commas. The datafiles must also be copied into a specific directory on the same disc as the main *Presenter* program files. I was disappointed that there was no facility to access data from other discs while the program is running.

The screen displays created by *Presenter* are clear and simple, but I found the range of options somewhat limited. For instance, it is not possible to highlight an individual piechart segment by 'exploding' it from the main body of the piechart. *Presenter* will only operate in a 16-colour mode, and there is no facility to add extra text or to customise the display substantially. Lingenuity appears to have assumed that users of this software will also have access to a separate graphic art package such as *Artisan.* This would certainly be essential should you wish to add any finishing touches to the display.

*GammaPlot* is a much more ambitious piece of software, and offers a much wider range of facilities than *Presenter.* Inevitably, it takes a greater effort to learn to use it; but Minerva is to be commended for its clear, illustrated manual, which includes a lengthy 'experimental' section. This takes you step-by-step through a demonstration

tutorial based around the sample datafiles supplied with the disc.

Rather than use the native WIMP system of the Archimedes, Minerva has opted for a menu-driven program. Some sections of the software make use of the mouse, while others rely solely on keyboard input. I found this to be rather inconsistent, and would have preferred to be able to use the mouse throughout.

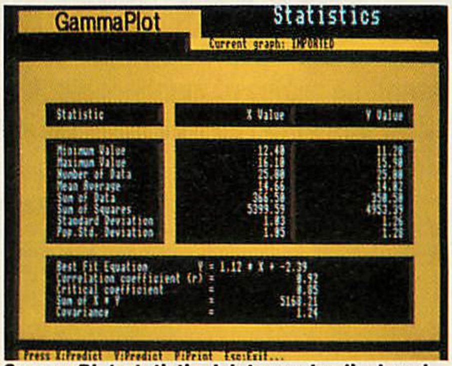
*GammaPlot* offers five basic types of graphs and charts; scattergrams, line graphs, piecharts, barcharts and three-dimensional barcharts. I was surprised, however, to find that neither *GammaPlot* nor *Presenter* allow you to plot 'stacked' barcharts, where each bar is subdivided into segments.

As data is entered, the current graph type is actually plotted in miniature in the top left of the screen. All the obvious options are available to allow you to tailor the basic graph display to your requirements. For instance, labels can be plotted in a choice of normal, thin or small fonts, and there is full control over the verticle and horizontal scales of the axes. You can also choose whether to use a 16 or 256-colour screen mode.

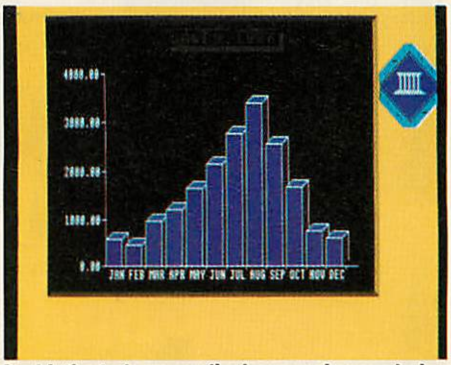
Having entered the data and defined the basic graph type, you must switch back to the main menu to view the full-sized graph display. This is where the software starts to show its real qualities. The screen 'window' which the graph occupies can be redefined using the mouse, allowing you to increase or decrease the size of the graph and to alter its position on the screen. Moreover, it is possible to store the data and window definitions for several graphics in memory at the same time. These can all be plotted at once, thereby enabling you to build up some quite complex and sophisticated screen displays, combining several different types of graph if you wish.

The data used in the graphs can also be analysed to provide an instant display of key statistical information. This includes minimum and maximum values, the mean value, the standard deviation, the line of best fit, the correlation co-efficients and co-variance.

*GammaPlot* also allows you to plot data using a series of macro commands. These effectively act as a mini-programming lang-




***Gamma Plot*; statistical data can be displayed**



**Sophisticated screen displays can be created**

uage which can be used to build up complex screen displays. They also allow you to pre-define certain types of data display which may need to be used on a regular basis, such as monthly sales graphs.

Some 28 commands are available, and these can be combined with eight standard Basic commands to control the screen display. As an example, the following sequence of commands can be used to load and plot the datafile 'SALES86' as a line graph, complete with line of best fit:

```
LOAD SALES86
FONT THIN
LINE SALES86
BESTFIT SALES86
```

More complex command sequences can be built up, including conditional branches and loops. Commands can be saved and reloaded, and there's a built-in editor.

The other major feature offered by *GammaPlot* is its built-in art package. This can be used to edit screens, and customise them to your requirements. It also offers sufficient facilities to act as a drawing package in its own right, operating in either 16 or 256-colour modes.

This customisation program is controlled by a series of on-screen menus, with most options selected and controlled using the mouse. It includes all the standard facilities offered by art packages, including air-brushes, a pixel editor and various shape-plotting options. Text can be plotted in a variety of sizes and fonts, and there is a choice of eight different types of boxes which can be used to highlight parts of the display. There is also a choice of screen dump options, including Epson-compatibles and Integrex colour-jet printers. It is also possible to load and display a series of screen displays in sequence as a kind of 'slide show', controlled by the mouse keys. A nice touch here is that the mouse pointer can be toggled on or off at will, enabling you to point to areas of the screen during a demonstration.

Data can be imported into *GammaPlot* in a variety of formats. There is obviously strong support for Minerva's own *System Delta* database in the form of a special linking program enabling you to plot data directly from the database files. Data can also be plotted directly from Ascii files, but these must be in an unusual format using Tabs to separate values instead of the conventional CSV file format.

Data can also be extracted from spreadsheets, but must first be converted into the correct file format. A special utilities menu allows you to do this, supporting *View-sheet*, *Intersheet*, *SigmaSheet*, and CSV spreadsheets like *Pipedream*. The *Gamma-Plot* manual was thin on this subject, but I found that standard CSV format Ascii files could be imported in this way, by regarding them as 'CSV spreadsheets'.

My overall impressions of *GammaPlot* were very favourable. It is a comprehensive package which, with a bit of ingenuity, can be used to create very sophisticated and attractive screen displays. It does, however, require considerable input from the user to get the most from the software. If ease of use is your main criteria, then take a good look at *Presenter*. Personally, I found it offered a rather limited range of display options, which don't fully exploit the capabilities of the Archimedes. But other users, particularly in education, may be attracted by its simple but clear screen presentations.

Presenter, *£29.84, from Lingenuity, Wood Farm, Linstead Magna, Halesworth, Suffolk IP19 0DU*, tel: 098-685 475. GammaPlot, £69.95 *from Minerva Software, 69 Sidwell Street, Exeter, Devon EX4 6PH.*

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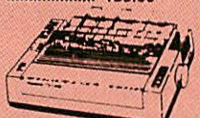
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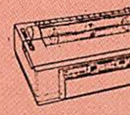
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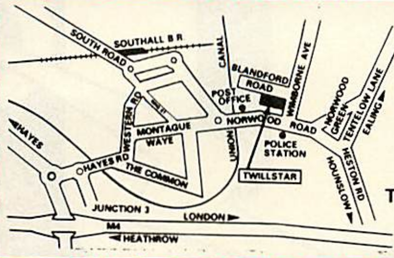
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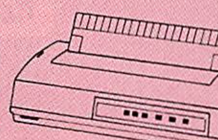
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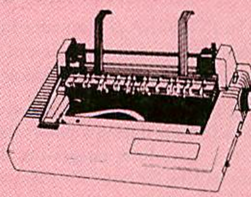
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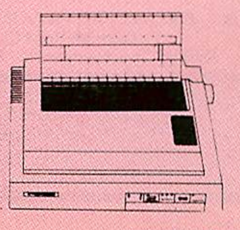
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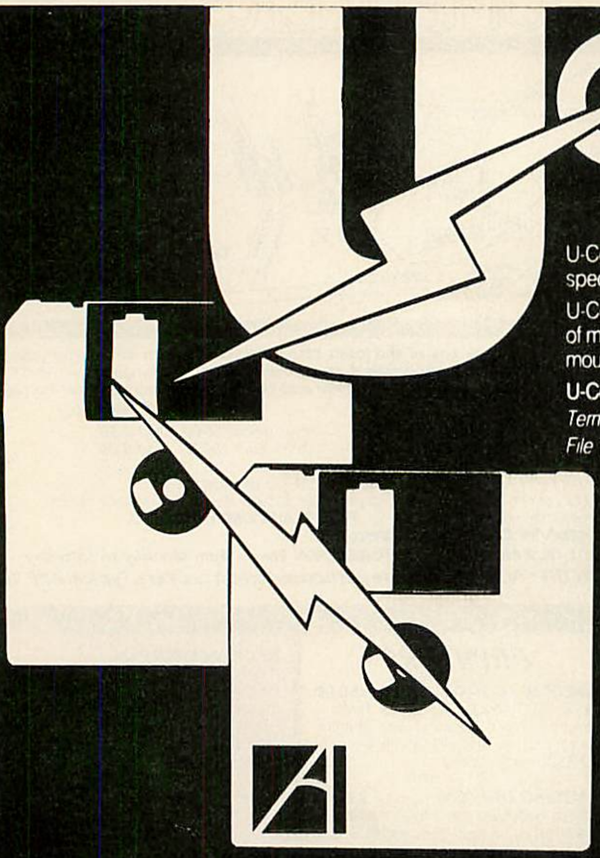


*CITIZEN 120D*



*CITIZEN HQ P40*

**PRINTERS**



SOFTWARE

# A SCHOLARLY STORE

**Researchers and academics will find ArcTFS – a specialist program for the Archimedes – a useful tool, says Dave Futcher**

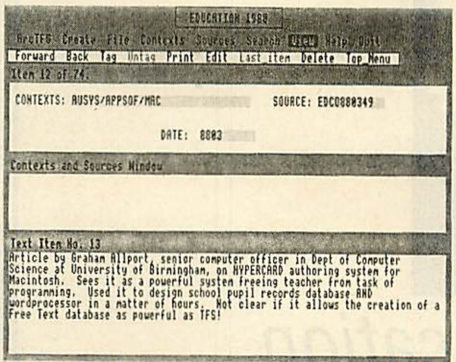
Both the wordprocessor and database have limitations for storing certain types of data. Neither is particularly good with unstructured information that you collect while studying a subject, like quotations, chunks of text, jotted notes and precis. To make the best use of this data you have to cross-reference it. But it lacks the conformity that you need for a database. Storing it in wordprocessed files is not that helpful and wordprocessors don't have the necessary sorting and selecting power.

*ArcTFS* may be the answer to every researcher's dream! It's a specialised system that you can use to organise all these disparate pieces of text. It is best described as a free-form filing system. The text items can vary in length from a couple of lines to a page or more, and *ArcTFS* stores them on disc economically and allows immediate access and manipulation.

*ArcTFS* actually uses four datafiles to manage the data, one each for Text, Context codes and Source codes, and a fourth known as the Linker file which links the other three.

Each portion of text is identified by a Context which states its relationship to the chosen theme, and a Source. The Linker file plays a central role – it links the other three files together. It's a database, containing pointers to the three other files, showing where the text, the context and the source start for each item. You can add extra information on each item too – a date field or a country of origin for example. However the larger the Linker file, the less room there will be for actual text.

The Context codes are the most important. They allow you to specify context or keywords which are appropriate to the piece of text you are filing. When a code is used for the first time, you are asked to write a definition – you can go back to it if you forget what the code means. For my own research, some of the Context codes might be APU (meaning Assessment and Performance Unit), KIREP (Kingman Report on the Teaching of English) and NATCUR (National Curriculum).




**The answer to every researchers dream**

The source of the information also needs coding. Again, examples from the same research include: EDCOMP (*Educational Computing* magazine), HAMMOND (Hammond, Ray. *Forward 100*, Viking, 1984), and EVANS (Evans, Nick. *The Future of the Microcomputer in Schools*, MacMillan, 1986). Prolific authors can also be coped with by using a slash: EVANS/86A. The Context file has room for 250 codes and the Sources file has room for 400 sources.

Once you have entered information for the Context and Source you can begin to enter the text you want to store. To help, *ArcTFS* has its own text editor. It's quite a respectable editor too, with most of the features that you would expect. The maximum length of text is 100 lines of 78 characters, and all this text area is accessible in a scrolling window of nine lines.

As well as typing in text, you can import it directly. For a start you can move references from one *ArcTFS* file to another. And wordprocessed text can be imported – this works wonderfully with *First Word Plus* files from the Arc and it should work with any other ASCII files, including BBC micro wordprocessing packages such as *Wordwise* and *View*. More and more researchers now log on to on-line databases (particularly American ones), and it is possible to import files downloaded from this kind of source.

You can't yet import from a Z88 portable, but an upgrade to do this is promised: this will be a great boon to researchers working with their portables in the university library!

Once you have entered some information, you can use it as you wish. It is easy to search for all references with a common Context – an excellent way of finding out what you have stored on a particular topic. These references can then be sorted or printed out, and they can be exported to *First Word Plus* ready for inclusion into your document.

It is possible to browse through the data, 'tagging' records which are of particular interest and selecting these for action.

The program does not use the Arc WIMP system at all, but has its own mouse-driven menu and help systems which are fast, unobstrusive and accurate.

*ArcTFS* comes with a 25-page spiral-bound A4 manual. It adequately explains all you need to know about this complex, but very usable, program. It even has a good index. I feel I can only really fault it on the lack of screen shots.

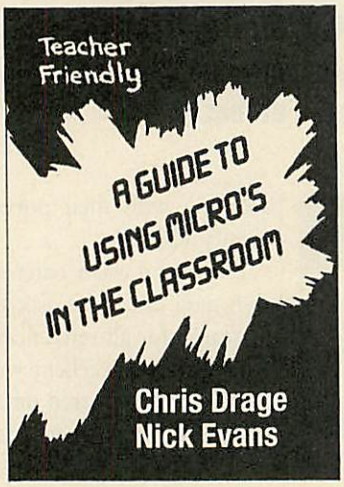
Although *ArcTFS* was designed as a research or study tool, it has applications in teaching. It also has possibilities as an extensive bibliographic database.

Anyone who has previously struggled with a normal database for referencing research material will be pleased that Texcellence has released *ArcTFS*. It certainly allows easier file creation, filing and searching than any normal card-index type databases. It is adaptable and it works. It allows sophisticated cross-referencing, searching, sorting and collating. I also value the fact that I can tag items in my large file and export them into *First Word Plus*, then process them ready for a paper I'm presenting. There is no doubt about the value of *ArcTFS* to the writer or the researcher. It's easy to use, and allows sophisticated searching and sorting of text. Anyone who needs to manage large amounts of this sort of information should find ArcTFS invaluable.

ArcTFS *costs £29.95 for the Archimedes from Texcellence, 2 Greenhill Road, Coleraine, Northern Ireland BT51 3JE*

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# TOUGH AT THE TOP

**Have you ever imagined yourself at the helm of a successful company? It's not such a big deal, as Michael Leete discovered**

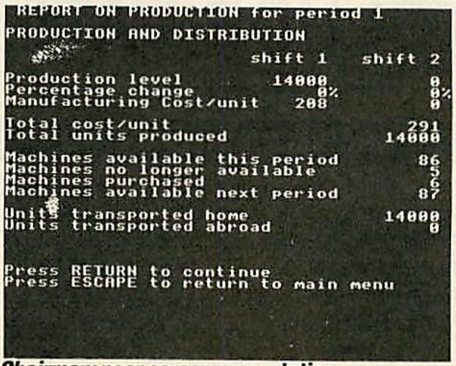
*Chairman of the Board* is a £60 package consisting of a single disc and two bundles of A4 paper bound with plastic coloured strips. Appropriate, as this method of binding is popular in business circles because it's easy to dismantle for photocopying. But it can't be laid out flat to read while you are typing. The bundles are inscribed 'Tutor's Manual' and 'Player's Instructions'. Both are well written, but the print and the quality of the paper mean that they probably won't make good copies for long.

The software supposes that the player, or team, has been appointed chairman of the board of a company that makes and sells microcomputers. The company is two years old, and so is the home market in which it operates. There is also an export market which is only one year old and so is less developed. The years progress in quarterly steps, and decisions in production, marketing and finance are taken by the board, then processed and reported upon by the computer

My own strategy, as the new chairman, was to make no new decisions until I had got my knees brown. Accordingly, in the first quarter, I studied the reports for period 0, and accepted the computer's suggestions. They happened to turn out quite well, although I soon found that they could be bettered. Evidently the retirement of the old board had been overdue.

The next step was to save that position before tackling negotiations for the overdraft facility in the next period. Unfortunately, saving the game is geared to a school bell, so it exits the program.

Having got back to the end of period one, I tried to see how the program coped with preposterous business decisions. It did just fine. I went bust in six months, and was told that the company was in the hands of the Liquidator. Pressing Escape produced the statement 'your company is bankrupt'. In retrospect, my decisions had not been quite as silly as I'd supposed. I had exceeded my borrowing limit in two successive periods but, at the end of the day, there was still cash in the bank. In real life, I might just have been in the hands of a Receiver appointed by the bank and the question of a liquidation would never have arisen. In any case, a company cannot be bankrupt – the proper word is insolvent.




***Chairman;* poor screen presentation**

So how was it that I had been trading successfully, though not optimising profits, and still blew it? The answer was that the program makes the unrealistic assumption that the cost of raw materials, manufacturing costs, delivery and salaries are paid out on the first day of the quarter. All income arrives on the last day. So apart from any opening bank balance, all operating costs have to be financed from borrowings for the full three months.

The program's blurb invites the player 'to manage and control all the key operations of a typical manufacturing company'. Yet this cash flow picture is not typical of any company I've ever encountered.

At this point I abandoned the program as a simulation and treated it as a challenge. This brought another major complaint. It is madness to sit in front of a computer and still have to use a calculator. You are told, for example, the unit cost of supplies and of manufacture but you have to do your own arithmetic to calculate the initial cash outflow. Not too difficult, perhaps, but if the mathematical consequences of decisions had been placed on the screen against the actual results of the previous quarter, nothing would have been lost and much gained – this is precisely how real forecasts must be presented.

Persevering, I took my next strategy from the lessons of Acorn. I reduced the price of the company micro to £499 (excluding VAT, of course, although the cash flow benefits of VAT in such a labour-intensive company are not considered in the program) and, since our export market obviously included the USA, steadfastly had nothing to do with it. In the short term, this helped the profit record so I calculated the best dividend that I could pay, with a view to a Rights Issue later on when the share price had risen. Then the share price plummetted.

Here, I read the Tutor's Manual, where I learned that the share price is fundamentally affected by the change in dividend payments in successive quarters. A good dividend record is only one of the factors that give underlying support to a share's price, but I cannot see the logic of a quarterly assessment. I also confirmed that greater emphasis is placed on promotional expenditure than is typical of most commercial enterprises. I accept the authors' analysis but take the view that far too much importance is given to marketing, while not a penny is spent on research and development. Both, I believe, would be essential to the chosen enterprise.

Frankly, I found the tutor's manual more interesting than the program. I think that a lot of good work has gone into the program and the two booklets, but not enough has been done to make the simulation realistic or typical. Without an exceptional tutor, it just isn't sufficiently instructive. Comparative figures between forecast and actual results are vital and I would have liked some on-screen comment about performance to draw attention, in particular, to failure to co-ordinate the resources of the company. As it stands, I cannot recommend the *Chairman of the Board*.

Chairman of the Board; £60 *from Leen Valley Associates, 36 Trevor Road, West Bridgford, Nottingham NG2 6FT.*

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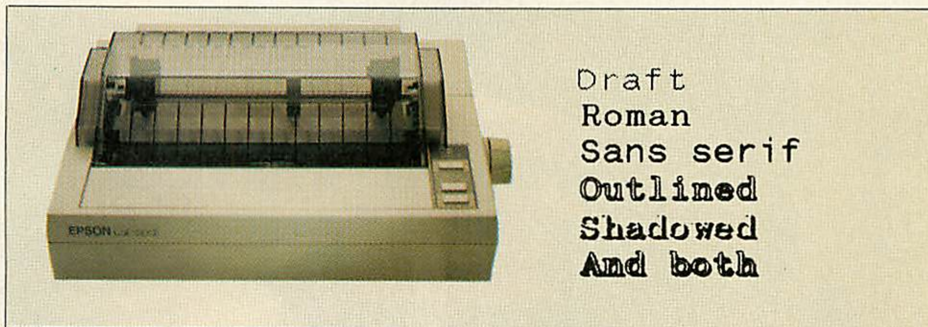
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HARDWARE

# STARRING TWO PRINTERS

**Because of falling prices, 24-pin models now dominate the printer market. Graham Bell has been testing two of the latest models**




**The Epson LQ-500 – no worries about its robustness but slower than the LQ800**




**The Star LC24-10 – a wider range of fonts and paper parking**

The latest Epson and Star printers continue the trend towards 24-pin dominance of all but the lowest price range. Each is a 24-pin printer with a variety of built-in fonts, flexible paper-handling, and a price that wouldn't have been unreasonable for a 9-pin model only two years ago.

The Epson LQ-500 is the baby brother of the LQ-800 model reviewed in *Acorn User*, November 1987. Physically it is well-built, with fairly chunky plastic mouldings and solid-looking metal parts and runs with a reassuring lack of clatter.

It comes not only with a cover that goes over the tractor feed that fits on top of the printer, but a lower one you can fit if you just want friction feed, and it has a paper-guide for single sheets. But tearing off sheets of paper is difficult as there isn't a sharp edge on the top cover.

Setting up is easy – the DIP switches are accessible via a hatch on the right side, where there's also a socket for an extra font card. I set it up to use the US character set with no automatic line feed, and once plugged in to my BBC micro or an Arc there were no problems printing. With all the wordprocessors I tried, it worked first time with existing printer drivers designed for the LQ800.

Graphics too were just like the LQ800. But remember that few of the 24-pin printers can fully emulate the 8-pin graphics of a 'standard' Epson printer. There are two problems in particular. First, 24-pin models feed the paper in 1/60 or 1/180-inch steps, whereas 9-pin machines use 1/72 or 1/216-inch units. This means there are often gaps between the lines of a screen dump. Second, the printers don't accept the ESC '*' 5 command that's often used in 'proportional' dumps (dumps that ensure circles appear truly round on paper). Having said this, the LQ500 performed faultlessly, running all the 24-pin dumps printed in *Acorn User*, as well as other software aimed at LQ800 owners.

There are two built-in letter quality fonts, one Roman and one sans serif, as well as the fast draft font. Examples of the two LQ fonts are shown above and they are as good as the other 24-pin printers tested over the last few months. Swapping between the fonts is simple – just press a button on the front panel.

The Star LC24-10 looks decidedly more streamlined than its boxy Epson counterpart, but it performs with a similar lack of fuss. Again it is built robustly, and setting up is simple. The DIP switches are underneath the ribbon cartridge – simple to change – but they are a bit too close to some other components for my liking. Like the Epson, one switch chooses between an 8k printer buffer and the ability to use up to 50 downloadable characters.

Paper feeding is better than the LQ500. The tractor feed pushes rather than pulls the paper through the printer, and it goes through a slot in the back of the machine. It seems less prone to sucking in the sheet it's just printed, and you can tear off very close to the bottom of a sheet and not waste too much paper. Plus it has 'paper parking' – you can wind out continuous paper part way, and feed in a single sheet at the touch of a button, print and then rewind the continuous paper again.

Once connected up, it gave me no surprises. Printing out from all my favourite applications went without a hitch, using LQ800 printer drivers. Just as the FX80 became the standard 9-pin printer, the LQ800 is seen as the standard 24-pin, and the Star emulates it almost perfectly.

Most of the features I tested, including 24-pin screen dumps, worked perfectly, and the text print quality is excellent. Draft, Courier, Prestige, Orator and Script fonts are built-in, and there's a front slot for font cards. All can be italic, and there are the same shadowing or outline options offered by the Epson.

The Star LC24-10 typically costs about £340, and offers extremely competent printing. It has better paper handling and a wider range of fonts than the LQ500, but seemed slightly noisier. Compatability with the LQ800 standard is little short of perfect. The Epson LQ500 is equally able, usually £15 or so cheaper, and is perfectly compatible with its bigger brother. But if you use both continuous stationery and single sheets, its lack of paper-parking make the Star a better bet.

PHOTOGRAPHS BY ANDREW CANTOURIS

SOFTWARE

# SCREEN SNATCHING

**Dave Futcher is impressed by Snatch, a utility package from 4Mation, which will be of particular interest to those involved in education**

4Mation, author of excellent adventures such as *Granny's Garden* and *Flowers of Crystal*, has now produced an outstanding utility package called *Snatch*, which will be of considerable interest in education, as well as to the general user.

Basically, *Snatch* allows you to print screens from programs while they are running, or to save them to disc for printing or displaying at a later stage.

*Snatch* will let you print almost any screen from educational packages instantly on both 9-pin and 24-pin Epson-compatible printers. All screen modes are supported and screens can be saved to disc for printing later just by pressing a few keys. It's also possible to choose whether to print the whole or part of the screen, and if you are not happy with the original colours you can change them.

There is also a built-in routine for displaying saved screens. The disc contains a pixel editor so that you can also make alterations to saved screens.

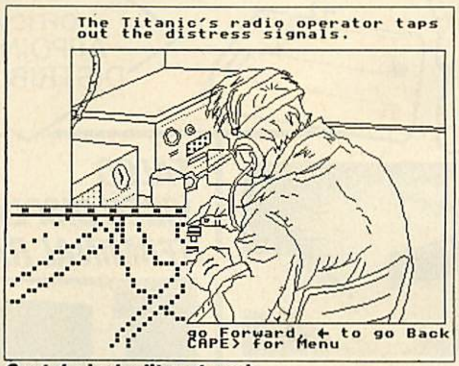
*Snatch* does not come as a ROM but as a ROM image that can be loaded into sideways RAM. If you only have access to an unexpanded Model B, 4Mation is also selling a version with easy-to-fit SRAM. It even provides a utility on the disc to check what your machine has got in the way of ROM and RAM.

*Snatch* is called into action by the command *SNATCH, which brings up a simple menu from which you choose either to prepare a disc or display screens. You must prepare a special screens disc before using the program.

Don't forget to format your disc normally before you let *Snatch* prepare it – the otherwise brilliant instructions don't seem to tell you that. The preparation consists of saving empty screens to the disc.

Using *Snatch* to print screens while your program is running is simple. You merely press a combination of three keys. For a black, white and grey dump press Shift, CTRL and E, and if you are using an Integrex colour printer you press Shift, CTRL and I.

*Snatch* dumps are of very good quality, but don't expect the control of orientation, width, height and position that Computer Concepts' *Printmaster* gives. You can, however, place the dump left, right or centred and you are able to reverse black and white.



**Snatch pixel editor at work**

| Format | | How many screens? mode 7 | other |
|---|---|---|---|
| DFS | 40tr | 19 | 4 |
| | 80tr | 19 | 9 |
| ADFS | s | 15 | 7 |
| | m | 15 | 15 |
| | l | 15 | 31 |

how many screens on one disc

| Printer | Screen mode 0 | 1 | 7 |
|---|---|---|---|
| LQ800 | 3.5 | 3.2 | 2.0 |
| LX86 | 4.0 | 3.2 | 2.5 |
| Integrex | 14 | 13 | 2.0 |

time to dump in minutes

**Disc type capacity and typical timings**

If you want to save screens to disc, simply press Shift, CTRL and X. It's actually a better idea to save screens to disc for later printing; especially in a classroom where printing holds up other people wanting to use the computer.

Print-out times depend on screen and printer types. So, the speed of a *Snatch* dump is as good as it could be, given the good quality of the dumps.

Something that *Snatch* has managed where both *Replay* and *ScreenPrint* failed is in printing 'dual mode' screens. A number of software developers use dual mode screens, placing text in one window and graphics in another. In *Snatch* the two modes are either 2 or 5 for the graphics and 1 or 4 for the text.

When you are ready to look at what you have saved to disc, you type *SNATCH and choose the Display Screen option. A whole host of options are available: Load, Enlarge, Wipe, Restore and Cycle. But there is no menu option for screen printing; you use Load to call up the screen you want and then print it with Shift, CTRL and E or Shift, CTRL and I, depending on your printer.

The Display Screens menu offers a tremendous option that allows you to enlarge any part of the screen. Once the screen portion has been enlarged you have a number of options available. It can be printed or saved to disc, or enlarged further. The possibilities of this enlarging option are enormous. Children can save and enlarge parts of graphics screens and print them as illustrations for their work away from the computer.

*Snatch* screens have no special characteristics – you can easily use them in a rolling display or children can put them into their own programs. You may need to change their colours with a VDU statement though. Teachers have found that children like to use computer graphics to illustrate their topic work. *Snatch* offers a great way to build up a library of graphic cut-outs.

The recently released framework package called *Windows* from MESU is crying out for additional screens, so *Snatch* will be a real boon here. And it's also possible to use saved screens for further development in graphics packages like *Quest Art* or AMX *Super Art*.

A bonus on the *Snatch* disc is 'The Pixel Editor' – ideal for touching up saved screens. Unlike some pixel editors this one is very simple to use. In the centre of the screen is a small box which can be moved around, and an enlargement of this is displayed in the bottom left corner.

Snatch costs £16 and at that price it is a real bargain. So get snatching!

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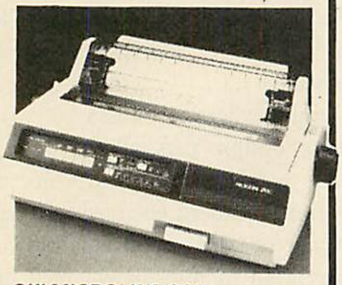
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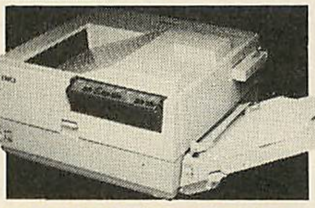
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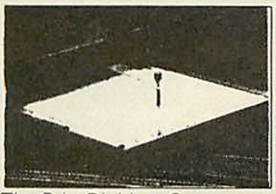
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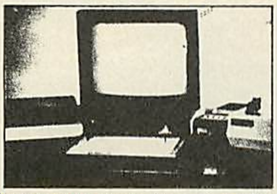
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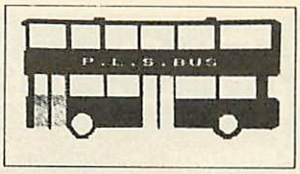
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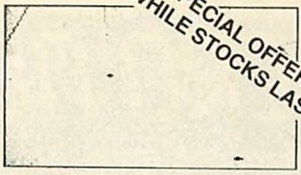
*Designed for use with the BBC Model B Microcomputer*

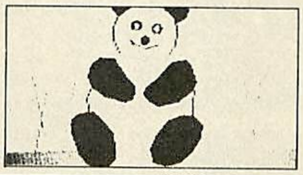










photos of screen image

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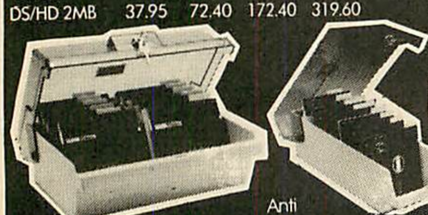
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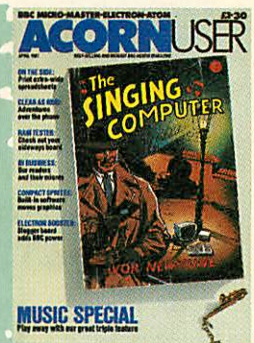
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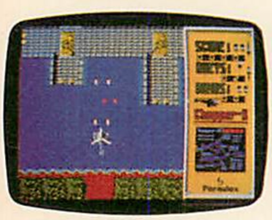
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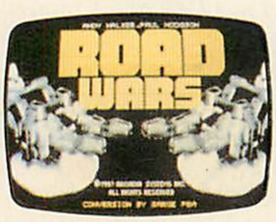
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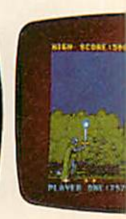
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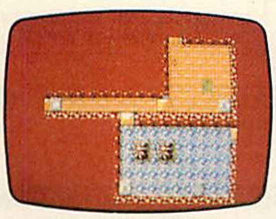
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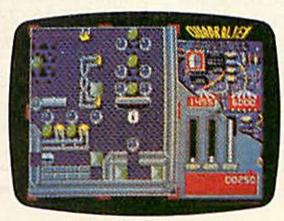
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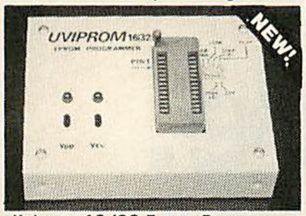



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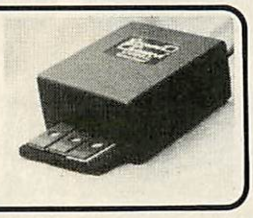
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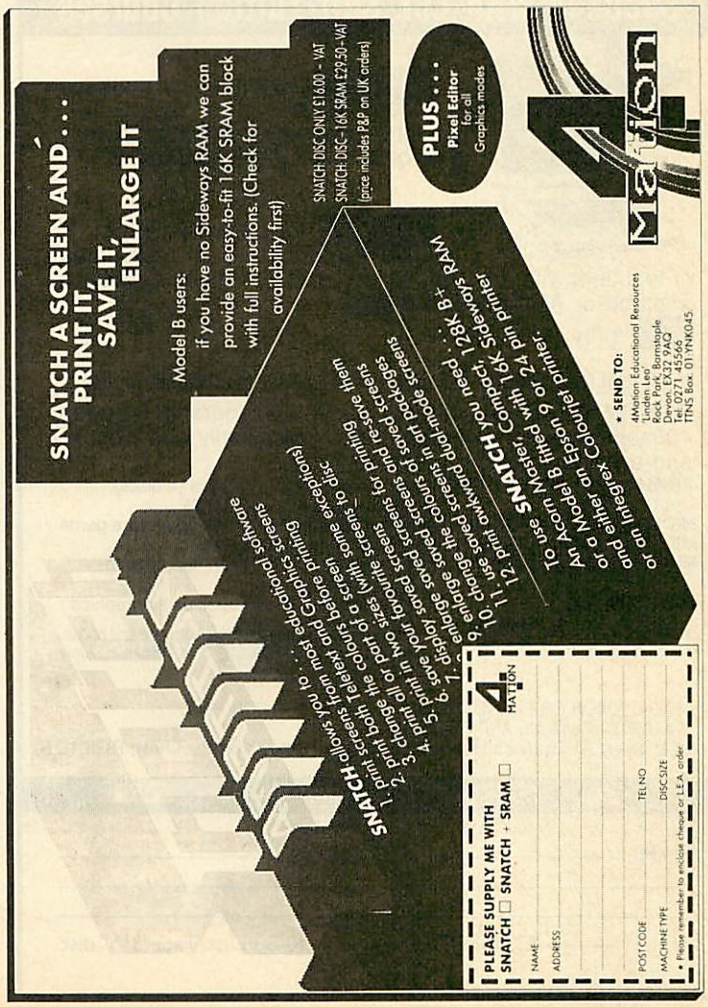
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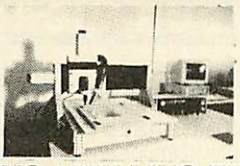
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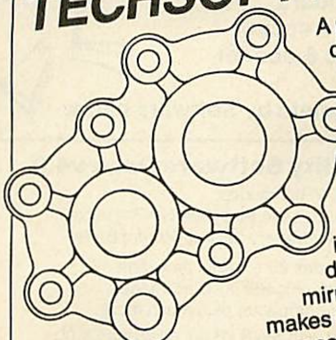
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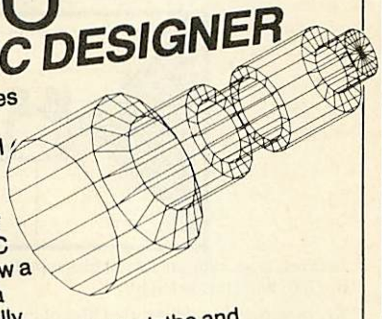


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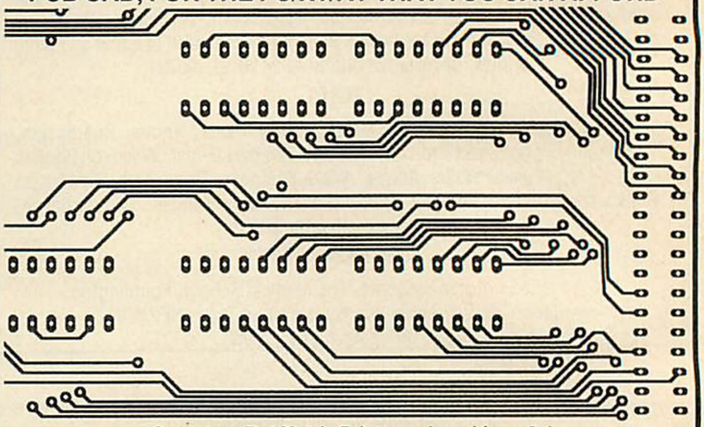
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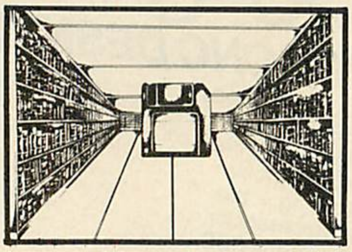
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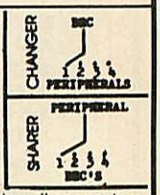






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For those who have upgraded from a B to a Master, to enable most old cassettes to be used. £14.94

**B+ to B Conversion**
Enables you to switch between OS 2.00 on B+ and OS 1.20 used by the B £14.95

**Write Protection Switch**
Fits internally in the Master to write-protect sideways RAM, no soldering required. £8.90

**Rombard 3 - for Master 128**
**Adds 3 extra ROM sockets.**
Works by replacing the computer's built-in ROM software with other ROMs (including the Inter-series from Computer Concepts). £17.50

**Romboard 4 - for Master 128**
**Adds 4 extra ROM sockets plus a Read/Write protect switch.**
Supports up to 4 ROMs, by overlaying either RAM banks or cartirdge slots. £26.50

**ADDCOMM - (not Master)** details available
Provides 40 extra BASIC commands including Graphics, Toolkit, and other utilities £23.00

**Matrix ROM - (not Master)** details available
Adds BASIC commands to enable matrix algebra in you own programs £26.00

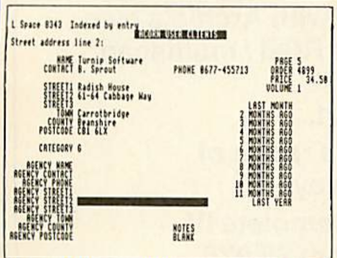
** All products fully documented*
** Full backup services available*
** All prices include VAT and postage*

For details/orders contact:
**Vine Micros Ltd, Marshborough**
**Sandwich, Kent, CT13 OPG**
**Telephone: 0304 812276.**

# LETTERS

Acorn User, 20-26 Brunswick Place, London N1 6DJ. BTG/TTNS 81:RED001

## SCREEN DUMPING



Sir, The utility to achieve screen dumps in the August 1988 Hints and Tips feature is one of the most useful I have come across. Unfortunately I can't get it to work with *ViewStore* on my BBC Master. The utility transposes text from the left-hand side to the right-hand side when printed either in sheet or card display. If other readers have this problem, I'm sure some advice would be helpful. No problem is experienced with Basic programs.

R Duncan
Somerset

Sir, I use *ViewStore* a great deal and was delighted to find the screen-dump utility in Hints and Tips, August 1988. Unfortunately I cannot use it as I use a 6502 second processor which is listed as incompatible. Can you recommend any modifications to the program that would allow me to use it?

Dr E Latusek
Derbyshire

**The program can be made to work on a second processor simply by changing line 2150 to:**

```
PROCoscli("SAVE PRTSC FF
FF0900 FFFF0"+STR$~end%)
```

**The FFFF before the two memory addresses ensures that the PRTSC program is loaded into the correct I/O processor.**

**R Duncan's problem arises (only on a Master) when there are sections of inverse video (black on white) as well as normal text: *ViewStore* uses inverse video to highlight the database name for example. The three extra lines below should cure the problem:**

```
1075 BMI loop0
1085 .loop0
1820 PROCchecksum(&900,end
-1,&80A0)
```

## TV ADDICT

Sir, Is it possible to use a BBC B computer to superimpose text over a television picture, for adding subtitles? If so, how can this be done?

A Dodd
Merseyside

**Computer text or graphics can be overlayed onto a video picture using a system called 'genlock'. In simple terms, this combines two signals to produce one signal containing both television and computer pictures, and so keeping the computer in step with the video signal.**

**Several companies manufacture genlock interfaces; Wild Vision (6 Jesmond Road, Newcastle-upon-Tyne NE2 4PQ; tel: 091-281 8481), Atomwide (23 The Greenway, Orpington, Kent BR5 2AY; tel: (0689) 38852). Both companies also produce genlock podules for the Archimedes.**

## WORKING WELL TOGETHER

Sir, I have recently bought a new 80-track (non-switchable) disc drive for my BBC micro and it works fine. I can also use my old 40-track discs on the 80-track drive by using a software fix.

My problem is that when I connect my old 40-track drive to my micro as well, using a two-into-one adapter, I can only use either the 80- or the 40-track drive, but not both together. I presume the software fix that makes the 80-track double step is also affecting the 40-track drive, thus making it a '20-track' drive.

Can you suggest another software fix or, even better, a way to make my 80-track drive switchable?

Alan George
Swansea

**Your best option is to change your current DFS for one that supports individual double-stepping. The Watford DFS will allow drives to be switched to double step individually, as does the Acorn 1770 DFS 2.2.**

## ANY FREE MEMORY?

Sir, Is there a reader out there who has managed to get more than 589824 bytes of free memory for the Archimedes PC Emulator, and if so how?

Does anyone know how to transfer data from standard 5.25-inch 360k discs to 3.5-inch discs (720k) used on the Archimedes?

At the moment, I am having to transfer the 360k discs to BBC format using the PUTFILE program on my Master 512. I then have to convert the disc back to IBM format using the GETFILE program and a 5.25-inch drive hooked up to my Archimedes.

N Newman
Farningham

**A twin-drive Arc running the PC Emulator and MS-DOS can copy from a 360k to a 720k disc.**

**To get this amount of memory for the PC Emulator, you have to unplug most of the modules, and reconfigure the memory map: the table gives more details.**

**A file called *PCSize does this automatically; it is included on this month's 3.5-inch *Acorn User* disc.**

**It's also worth upgrading to the latest version of the PC Emulator, V1.2; you can upgrade by returning your original Emulator discs, plus £15 to Acorn Customer Services, Acorn Computers, Fulbourne Road, Cherry Hinton, Cambridge CB1 4JN.**

## ELKS MOVE UP A CLASS

Sir, We have a number of Electrons at school. As their second-hand value is negligible, it would make good sense to upgrade them to (near) BBC-compatibility. Ideally, I would like this to be a disc-based system, but I do not relish the

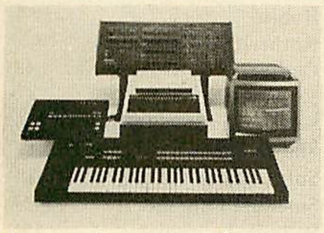
thought of taking out a second mortgage to pay for all the equipment!

Can you suggest a solution? I have heard that ACP do some kind of disc system.

C Price
Merton Court School

**A company called Pres (6 Ava House, High Street, Chobham, Surrey GU24 8LZ; tel: (0276) 720467) is now responsible for marketing ACP products. It has a wide range of add-ons for the Electron, including a complete 3.5-inch disc upgrade for £114. Other products include 5.25-inch disc interfaces and sideways RAM and ROM boards.**

## MASTER MUSIC



Sir, I am the owner of a Master 128, and was wondering whether it is possible to use it as an audio sampler or MIDI controller, without the need to buy Hybrid Technology's Music 200 or similar.

I was thinking of using the analogue port as a sampler, but this would be limited to sounds of about 100hz (a low growl). The RS423 seems a good choice for a MIDI port, although, again, this is too slow; 19.2 kbaud to MIDI's 31.5 kbaud.

Would adding a Turbo board, or other second or co-processor help to speed up these two interfaces?

Bruce Eddy
Dundee

**Adding a co-processor will increase the speed of your computer but will have no effect on the various ports. If you are serious about using your Master for music, it may be a good idea to first buy a MIDI interface and then add a separate sampler via that.**

**Three companies produce such interfaces: Electro Music Research: 14 Mount Close, Wickford, Essex SS11 8HG, tel: (0702) 335747; Hybrid Technology, Unit 3, Robert Davies Court, Nuffield Road, Cambridge CB4 1TP, tel: (0223) 316910; and Umusic, 17 Parkfields, London SW15 6NH, tel: 01-788 3729.**

## HIGH STREET ARCHIMEDES

Sir, I would just like to make a few comments on the Archimedes. Although the machine is a terrific achievement for Acorn, albeit an expensive one, the sales of the Archimedes have been atrociously handled.

It has been over a year since the Archimedes was first launched, and there are still only a handful of software packages available. People are more likely to go out and buy PC-compatibles that already have a large software base.

Why don't Acorn sell the Archimedes through high-street stores, such as Dixons, in a similar way to the Amstrad range? More people would see the Archimedes and then, perhaps, more would be sold.

Angus Baigent
Isle of Mull

## JUST SAYING HELLO

Sir, While 'playing' with my BBC computer, I found an interesting, though not disastrous problem with the RENUMBER command. First enter PRINT CHR$141; "HELLO". Now try typing in the following, using the Copy key to copy the CHR$(141) character off the screen into the quotes (it's the space before the half H):

```
10 PRINT"<CHR$141>HELLO"
20 PRINT"<CHR$141>HELLO"
```

Running the program in mode 7 will obviously produce the word 'HELLO' in double height.

If you now RENUMBER the program, you get two errors; 'Failed at 10' and 'Failed at 20'. This does not affect the program and it will still execute. Have you any suggestions as to why this happens?

P McDonald
Scunthorpe

**To understand the problem, you need to know how the BBC stores line numbers internally. Programs are held in a tokenised form. That is, codes are used to represent keywords (such as IF or THEN) in order to save space. The full list is printed in the BBC User Guide.**

**Code 141 is used to represent GOTO. When the program is renumbered, the computer finds a GOTO token and so looks for a line number immediately after it, in case it needs changing. What follows ('HELLO') is not recognised as a line number and so the renumber fails.**

**This 'feature' is only present in Basic 1 and 2. In Basic 4 onwards, anything between quotes is ignored when renumbering.**

## DATA REMOVAL

Sir, I am trying to use an Osbyte call to read data from the serial input buffer, but I am unable to get the data out. I have tried to use:

```
A%=145:X%=1:Z%=U
SR &FFF4
```

but this doesn't return the data in the Y% variable. Can you help?

Neil Gladden
Auckland

**Osbyte 145 returns the character from the buffer in the Y register of the 6502 chip. USR doesn't put the A, X and Y registers back into the three different integer variables as you might expect – they all get added together and put in Z% (in the order &PPYYXXAA). To find what Y is, you must use:**

```
Z%=USR &FFF4
Y%=(Z% AND &FF0000) DIV
&10000
C%=(Z% AND &1000000) DIV
&1000000
```

**This way, C% is set to 1 if the buffer was empty; if it wasn't, then Y% is the character read from the buffer.**

## OF RELEVANCE TO ATOMS

Sir, I have an Acorn Atom and I am disappointed that I can no longer find anything in your magazine for my computer. It would be nice to see you rectify the matter by providing programs, games or even a sell and swap column.

Finally, I would like to ask if there are any other Atom users out there? If so, would they like to sell or swap programs, ideas etc?

D Peploe
Newport

**I suggest you contact Robin Bradbeer of the London Association of Computer Clubs, Polytechnic of North London, Holloway, London N7 8DB for information about an Atom user group.**

# ACORN USER ADVERTISEMENT PAGES – NOVEMBER 1988

# FREE ADS

**Penpals** wanted (teenage) with BBC B and disc drive, to swap hints and tips, etc. 56 Ellis Avenue, Rainham, Essex RM13 9TU.

**Penpals** BBC B/Archimedes for mutual assistance, chat. Also *Repton* addicts, any age/sex. Doug Bishop, Shauna New Barnstaple Rd, Ilfracombe, Devon.

**Z80** second processor plus extra software, £200. AMX mouse with *SuperArt*, etc, £50. Tel: (0295) 750758.

**Nightingale** modem and Commstar ROM for BBC B, as new. Complete with leads and manuals, £85. Tel: (0706) 46419.

**Master** 65C102, 6502 turbo co-processor, £70. Tel: (0793) 770886.

**Compact** AMX mouse, £20. With *Super-Art*, £30. Mertec companion, £25. Wanted colour or monochrome monitor. Tel: (0222) 811076.

**Printer** Shinwa CPA80+, £75 ono. Tel: Nigel (0203) 504254.

**BBC B** OS 1.2, joystick, cassette recorder, manual, books, £200 + worth of software. All £250. SE Wales area. Tel: (063349) 350.

**Swap** my Triumph Toledo, MOT Aug '89, alloy wheels for your BBC B computer, plus dual 40/80T, DS disc drives, monitor. Tel: (0509) 843214 eves.

**BBC B** OS 1.2 40/80T TDS drive. Hi-res monitor, modem, software, manuals, boxed. £350 ono. Tel: 01-837 7165.

**Acorn** Electron, Master RAM board, advanced Plus 1, Plus 3, unit. Also user port, Pascal, *View*, *ViewSheet*, £225. Tel: 051-737 1224.

**BBC B** 2x40/80T drives, 32k sideways RAM/ROM board. ZIF socket, various ROMs, 70 discs, manuals, £450. Tel: (0635) 524501.

**Master** 512 DOS+ Gem mouse, colour monitor, dual 40/80T disc drives, printer, many ROMs, games & manuals, £900 ono. Tel: (0494) 675670.

**Master** 128 turbo, £300. Acorn Music 500, Hybrid Music 4000, keyboard, offers? Tel: Chesterfield 70730, eves.

**Acorn** second processors as new, 65C102 cased, £125. Z80 cased with software manuals, plus *Wordstar* profession, £160. Tel: (0525) 375179.

**BBC B** issue 7. Acorn DFS, software £225. Disc drive, 40T double sided. 30 5.25-inch discs, £75. Tel: Sunbury 788322.

**BBC B**, Amstrad, Dragon bits and pieces for sale. Must go soon! Tel: Jeff, 01-997 5555 ext 278.

**BBC B** issue 7, Solidisk DFS,ADFS, Ziff, £250. Tel: 021-550 6197 (Ansaphone).

**BBC B** OS 1.2 DNFS, 32k SWR, *View*, £275. Or swap for Master 128. Tel: (0223) 246753.

**Archimedes** 310 colour system, PC emulator, reference manuals, boxed as new, £900. Tel: Alan (0256) 464889, eves.

**Compact** base system including ROMs *ViewStore View*, Logo dumpmaster, ACP. Advanced 1770DFS leads, Viglen ROM adapter, digimouse, £325. Tel: 01-986 4442.

**BBC B+** 1770DFS, 2 40/80T, disc drives, Cub452 monitor, *Wordwise*. KP10 printer, trackerball, *Quickshot*, Voltmace, joysticks, loadsa games, manuals, £700. Tel: (0753) 86573.

**BBC B+** issue 7, 1770DFS, 2.0 OS, DSDD disc drive +PSV. £50+ software, books, mags, etc. Perfect condition, boxed, £370 ono. Tel: (07456) 2698.

**Electron** 64k Plus 3, Plus 1. AP2 AP6 printer, 14-in colour TV. Second processor, joystick, discs, cassettes, books, cartridges. ASR, ABR recorder, £300 ono. Tel: (0533) 873915.

*Acorn User* magazines, 26 total, '85-'88, £5. Buyer collects. Tel: Burgess Hill, 45116 eves.

**BBC** ROMs, NLQ ROM, £10. TDROM, £10. AMX ROM, £10. *WordwisePlus*, £15. Also, Beebugsoft *Design*, £5. Hershey fonts, £10. Tel: Mike (0293) 515320.

**Electron**, AP1, AP3, data recorder, Voltmace joystick, tapes, blank discs. ROM cartridge, mags, manuals, as new, £200. Tel: (0252) 837721.

**Turbo** co-pro, £80. Master reference guides, 1+2, £20. Overview packs 1+2, £60. 2 socket ROM cartridges, £5. Tel: Paul 01-886 8594.

**BBC+** 32k hi-res colour monitor, 40/80T disc drive. Joysticks, stacks of software, mags, books, DFS 1.4, £350. Tel: 01-229 2926.

**BBC B** issue 7, 40/80 + DS disc drive, 50 discs, AMX mouse, sideways ROM/RAM board. 12 ROMs+ manuals, 16k sideways RAM fitted, £400 ono. Tel: (04252) 71784.

**Electron** and almost 200 games, including over £300 of originals. Ideal Christmas gift. First reasonable offer. Tel: (0698) 52293.

**Second** processor 32016, £500. Latest panos, 40T disc drives, £30. Tel: (050841) 8152, eves.

**BBC** micro ROMs *Wordwise*, toolkit, Exmon graphics, £15 each. Acornsoft Forth, Lisp cassettes, plus textbooks, £12 each. Tel: (0232) 702417.

**Master** with co-processor, Cumana DS 40/80T disc drive, trackerball, mouse, light-pen, software, manuals, £500 ono. Tel: (0782) 774187, eves.

**AMX** mouse, Master 128 version, plus *SuperArt*, £20. Tel: Burgess Hill, 45116 eves.

**BBCB**, Acorn DFS Microvitec 1431 monitor, 16k sideways RAM. AMX & trackerball speech processor. Joystick, Music 500, may split. Tel: 051-426 1202.

**Acorn** 6502 second processor, £60. Tel: (0742) 680541.

**Microvitec** high-resolution colour monitor, (as new), £140. Epson MX-80 F/T+ printer (as new), £120. Tel: (0272) 566415.

**BBC B** *Wordwise Plus*, *Wordaid* ROMs, £30 for both. Tel: Mr Noble, 061-431 5854.

**BBC** Master 128k with 6502 second processor. 20M hard disc, monitor, printer, disc drive, leads and casing, £650. Tel: (0491) 575192.

**Centronics** GLP II printer, tractor feed, roll paper and stand, £90 ono. Also games. J Prinner, 10 Moor Park, Millom, Cumbria, LA18 5DX.

**BBC B** OS 1.21 *Wordwise*, games, £150. *Barbarian*, £8, *Spyhunter*, £6. Revs and Revs, 4 tracks, £5. All cassettes. Tel: 078-571 4168.

**Acorn** 65C102 Turbo board, £80. RH video digitiser, £100. Both with original software and documentation. Tel: (0222) 614401 eves.

**Master** 128, 40/80T disc drive, Music 500, AMX mouse, tape recorder, joysticks, instant *Mini Office*, books, magazines, 200 discs, £420. Tel: 061-223 1883.

**Master** 128/512, Microvitec Cub medres, Akhter MD802E drives with PSU. Vast software library, £550. Tel: Mitchell (0202) 33630.

**BBC** B+ 128k Cumana disc drive, printer, colour monitor, Z80 processor, modem, Torch, graduate software, manual, mouse, joysticks. Tel: 01-935 0640.

**BBC B** OS 1.2 Torch-A80, twin 400k 80T drives. *Perfect* WP, database, spreadsheet, programmable database, accounts program. Monochrome BBC monitor, £350 ono. Tel: (0604) 32287.

**Electron** AP4 disc I/F, T2P4 transfer ROM, advanced disc toolkit, Starmon, all for £120. Tel: Alan (10923) 30097.

**Watford**, video digitiser for BBC B, £75. Tel: (08293) 2727.

**Archimedes** 310 + second internal drive and 10 discs, £825. Master Compact + second internal drives, £265. Phillips colour monitor, £150. Tel: 01-572 2917.

**Z80** second processor, £160. Z80 turbo Pascal, £22. ATPL sidewise, battery backed RAM, £33. EPROMs, games, books', list available. Tel: (07618) 521.

***Electron User*** group. Monthly newsletter, 26p + SAE. From: Dave Smith, 3 Goosetree Estate, Rings End, Wisbech, Cambs PE13 4DE.

**Phillips** monochrome moniter (green) with lead, £35. Datachat, modem, Commstar 2, £30. Prism 2000 Modem, Micronet, software, £20. Tel: (0734) 665180.

**Master** 128 for quick sale, hardware from mouse to modem, cost £1000, sell around £750. Might split. Tel: (0602) 817935 eves.

**Archimedes** A310M colour, 2nd drive, *First WordPlus*, other software, games, Star LC-10, mint condition, with boxes, £110. Tel: 01-550 4826, eves.

***View 3***, complete package, including printer driver, software, £30. Includes postage. Tel: Alan (0978) 759732, eves or weekends.

**BBC** Master, 40/80T disc drive. Manuals, Beebug C, language software, games, parallel printer lead. Excellent condition, £500. Tel: Shahid, 01-847 3321

**Master**, 512 upgrade, twin 40/80T drives, Citizen printer, books, software, joysticks, new, £1300. Selling £650 ono. Tel: James, Frodsham 32993.

**BBC** Model B + DFS, £275. Music 500, £80. Graphics ROM, speech ROM, Sleuth, offers? All hardly used. Tel: 061-799 5766, eves.

**Econet** utilities, all on DFS or ADFS. Send SAE for details. D Penny, 98 Laburnum Crescent, Allestree, Derby DE3 2GS.

**Sanyo** monitor, 12-inch, green. New £55. Acorn monitor, 12-inch, green, as new. Tel: (098982) 537.

**BBC B** 100k, disc drive, books, joystick, games, discs, issue 4, £225. Tel: (0822) 854148.

**BBC B**, with 40/80T dual drives, colour monitor, joysticks, manuals, plus software and magazines, £475. Tel: Ravi 01-902 0397, eves.

**Wanted** *Spellmaster* ROM. Curry, 12 Carnvue Avenue, Newtownabbey BT36 6RA.

**Wanted** EMR MIDI interface, plus software. Tel: Andy, (0602) 279657, eves.

**Wanted** Penman plotter, working condition, for BBC. Tel: Ian, 091-536 5821.

**Acornsoft** - Mirle business software. Accounts receivable and stock control programs wanted. Also instruction manual for mailing system. Tel: (0222) 593412.

**BBC B** Opus Disc Drive 40/80T, Tandy Printer, mono TN, software, *Mini Office II*, etc, £260. Tel: Mick (0293) 884409.

***Acorn User*** magazines for sale. Full set, except first issue. Offers? Tel: (02406) 3217.

**Morley** Teletext Adaptor with ATS and support ROMs, plus utilities disc and PSU, £85. Tel: (0933) 679954.

**Master** system disc, colour monitor, mouse, software, modem etc, £750. Lot or split. Tel: (0602) 817935 eves.

***Acorn User*** magazines, Oct '82 to Mar '86. You arrange delivery and they are yours. Tel: (0533) 541076.

**BBC B** ROM/RAM board, dual disc drives, 20 ROMs, including *View*, *ViewSheet* plus games and joysticks, £475 ono. Tel: (0895) 391267.

**Acorn** Electron, Plus1, Plus4, Disc Drive, second processor, lots of software, books, ROMs, *Electron User* magazine. Will split. Tel: 051-342 6472.

**ZX81** .16K, + games, educational cassettes, boxed as new. Offers? Tel: (0202) 875122.

**Econet** Module for BBC Master. Will sell for £29, (worth £50). Tel: James (0482) 861307 eves.

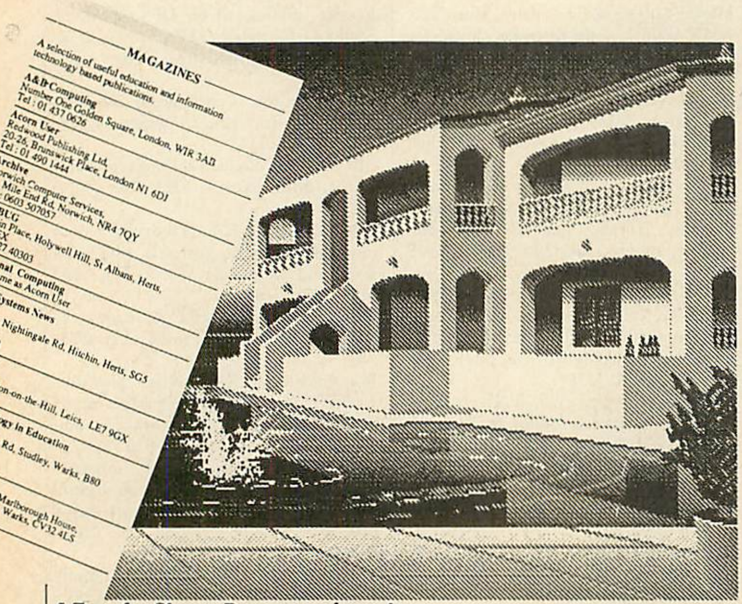
## FREE PERSONAL AD SERVICE

**Fill in the form below to a maximum of 20 words (one in each box) and send it to *Acorn User* Free Ads, 20-26 Brunswick Place, London N1 6DJ. Please use capital letters, write clearly, and remember your name, address and telephone number. Without this full information, supplied on a separate sheet of paper, we regret we cannot carry your Free Ad. We cannot accept entries selling or swapping software. This is a service to readers – no companies please. One entry per form only. Free Ads are carried in the magazine as space permits, and any Free Ads not used within a month of receipt will be disposed of.**

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# ACORN USER'S

## DIARY




**A Tony for Clares; Resource miss out.**

## Tony award for Clares

This month's Tony award for packaging and publicity must go to Clares Micro Supplies. It provided some superb demonstration pictures to go with its *ProArtisan* painting package. But sadly the leaflet was not up to the same standard. According to Clares, it's the 'ultimate designers palette'. And WIMP stands for 'wimps, icons, mouse and pointers'. A good example of recursion. And that's just the tip of the iceberg.

A close second this month is Resource. Formerly known only for its calendars, its latest promotional item is a list of names, numbers and addresses of the good and the great in the educational computing world. Clever, because the list of names and addresses in the booklet could also be used as a mailing list to send the thing out! And it comes pre-punched for your personal organiser.

Nice try. The first number Orson tried was wrong. This would normally deserve some severe abuse, but it turns out to be quite useful after all.

## Tales from Cambridge

Rumour from the land of the Acorn continues to flow, particularly after the first installment of our intriguing history of the company. Apparently the typical reaction at Fulbourne Road is to immediately phone Roger Wilson and ask if that really was his own hair in the photo.

The latest gossip is that on Orson Fact's latest incognito visit to Cambridge, he noticed lots of shiny new manuals and specification sheets lying around the Acorn 'inventions' department.

Sagely, he murmured 'Ah, the new operating system', pretending he already knew all there was to know about it. But no, they turned out to be for Impulse, Computer Concepts rival system. Hmm. And yet curiously, some of the capabilities of RISC OS appeared to be quite a surprise to the team from CC.

## Curse of Abuser

*Acorn User*'s exclusive 'pre-announcement' of RISC OS 2.0 in the July issue certainly turned a few heads at the Acorn headquarters.

One effect was a rapid change of the name of the system, from Arthur 2.0 to RISC OS – is this because of the Dudley Moore film we pointed out in September? Even then, RISC OS is not entirely a good choice, as it can be shortened to 'ROS'. That's owned by someone entirely different.

## Lizard Lore

Our rural readers might like to sneak a look at the October issue of *Country Life* magazine. As well as all the usual features, it's got a complete six-page feature on Repton.

Not, in this case, the computer game, but instead the famous eighteenth century landscape gardener. Still, it might just give you a few ideas for new screens...

## Blunderbox

*Acorn User* may make a few mistakes – you only have to look at the Noticeboard page to find the list of blunders. But that's nothing. Take this reply to a reader's letter:

> **Laser printing**
>
> *I HAVE recently bought a Hewlett Packard Laserjet series 2 printer and it works wonders on my Apricot Xen. But it does not work on BBC B – it ...*
>
> ● Unfortunately nobody in the office has any experience with this printer which – don't be fooled by the name – is not a laser printer but is actually a high quality inkjet. So we can't help; can any reader?

**130 MICRO USER August 1988**

The Hewlett-Packard Laserjet is only the world's most popular laser printer. It's effectively the FX80 of the laser printer world. And this month, there's even a BBC mode 1 screen dump for the laserjet, in Top of the List on the yellow pages.

And the cover flash that claims the *The Z88 User* is 'top selling' is beginning to look a wee bit frayed – *Acorn User* sells 20 per cent more copies than it does every month.

In the interest of balance, though, does this beat *C&D Confusing*'s great October cover flash? Sadly all the cut out-'n'keep guides to DTP had already been cut out 'n' kept from all the issues in our local newsagent.

Next month, Clive and Darrin plan a snip out'n'stick uniform for Commander Jameson – an idea you may recognise if you ever had a Cindy doll. There always seemed to be cut-out dress patterns in magazines like *Mandy* and the *Bunty*.

CUT OUT AND KEPT Guide to Desktop Publishing




## BECOME THE WORLD CHAMPION — BY FAIR MEANS OR FOUL

A realistic boxing simulation. You can even cheat... if the ref's not looking!

You're behind on points and time is running out. The ref looks half asleep. A quick head butt and a sly punch below the belt and your opponent is toppling over. But as he falls, his knee strikes you a paralysing blow. "Foul" shouts the crowd, and your opponent is disqualified.

You've won, but in the next championship contest you meet a boxer who knows more dirty tricks than you. It needs skill and cunning, lightning responses and deadly strategy. Have you got what it takes to become the World Champion — By Fair Means or Foul?

### FAIR AND FOUL MOVES

| | | | |
|---|---|---|---|
| Fair Moves | Head Punch<br>Body Blow<br>Upper Cut<br>Duck Punch | Foul Moves | Head Butt<br>Knee<br>Groin Punch<br>Kick |

COMMODORE 64/128 • SPECTRUM • AMSTRAD CPC 464/664/6128
BBC MICRO B/B+/MASTER/MASTER COMPACT • ACORN ELECTRON

| | | |
|---|---|---|
| Cassette: | £7.95 | Spectrum |
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